

Australian Model Engineering

September-October 2002

Issue 104

\$6.50*
(inc. GST)

NZ\$9.50*
(inc. GST)



LOCOMOTIVES, TRACTION & STATIONARY ENGINES, BOATS,
WORKSHOP, PRODUCTS, CLUB NEWS & EVENTS, REVIEWS

In This Issue: ☒ Make a Simple Digital Speedo For Your Loco
☒ The Hot Pot Simmers in Wollongong
☒ Build Your Own Workshop Press



Print Post Approved, Publication No. PP228582/00001

*Recommended Retail Price

THE MOST VERSATILE TOOL FOR TURNING & FACING

It's easy to see why our biggest selling turning tool is the SCLCR. This tool can turn and face a bar without altering the toolpost, and the 80 deg nose angle gives it much more strength than a 60 deg (triangular) insert.

Tool comes complete with tough, wear resistant insert in our grade NJ17. This will cut steel, stainless, cast iron, phosphor bronze, brass, copper, aluminium etc. Please state shank size required - 8, 10 or 12mm square section. Spare inserts £4.58 ea for 6-10mm, £5.29 for 12mm



SPECIAL OFFER PRICE £30.40

(MRRP = £56.34) Please add £4.75 to cover p+p to Australia

PROFILING WHEELS or SHAPING AXLES & PILLARS?

If you need to create fancy or complex shapes, our SRDCN button tool is invaluable. The 10mm square shank holds a 5mm dia cutting insert, and gives great versatility, superb strength and excellent tool life.

Tool comes complete with insert in supergrade NJ17. Spare inserts just £3.61 each. Mr D Hudson of Bromsgrove SME has used these tools since 1995 to profile the special form of tyre treads for his self-steering wheel sets with great consistency.



SPECIAL OFFER PRICE £30.40

(MRRP = £55.37) Please add £4.75 to cover p+p to Australia

TURN SMALL DIAMETERS with LIVE CENTRE IN PLACE!

The SDJCR tool uses a 55 deg insert, allowing access to small components whilst using a tailstock centre. It can also profile back-angles, and is a very worthwhile addition to our range. Shank is 10mm square.

Tool comes complete with insert in grade NJ17, to cut virtually all engineering materials. Spare inserts £4.58 each. Some of our customers even use these tools for roughing out 55 deg screwthreads. What will you use yours for?



SPECIAL OFFER PRICE £30.40

(MRRP = £56.34) Please add £4.75 to cover p+p to Australia

WAKE UP FROM YOUR NIGHTMARE WITH KIT-Q-CUT!

Our Kit-Q-Cut Parting Tool fits the vast majority of ME lathes, including ML7 & ML10 machines, regardless of toolpost type. The tool can part through 1.58" dia. bar. Hundreds of compliments from delighted users!

Tool comes complete with key for inserting and ejecting the insert, and tough, wear resistant insert in Sandvik's grade 4125. This will cut virtually all materials. Spare inserts just £7.64 each



SPECIAL OFFER PRICE £46.00

(MRRP = £69.00) Please add £4.75 to cover p+p to Australia

A TOP QUALITY BORING BAR FOR YOUR LATHE

Here's your opportunity to own a top quality boring bar which uses our standard CCMT06 insert. The 8mm dia bar will bore to a min dia of 10mm. The 10mm bar can bore down to 12mm, and the 12mm has a minimum bore of 16mm. Steel shank boring bars can generally bore to a length of approx 5 times their diameter. Please state bar dia required - 8, 10 or 12mm dia. Comes complete with insert in all-purpose grade NJ17. Spare inserts just £4.58 each.



SPECIAL OFFER PRICE £33.90

(MRRP = £71.85) Please add £4.75 to cover p+p to Australia

NOTE OUR NEW ADDRESS!



GREENWOOD TOOLS

2a Middlefield Road, Bromsgrove, B60 2PW, England

Phone: +44 1527 877576 - Fax: +44 1527 579365

Email: GreenwTool@aol.com

BUY ONLINE: www.greenwood-tools.co.uk

Engineering Tools

2Pce No.1 Morse Taper Reamer Set (Coarse & Fine)	\$55	9Pce Bi-metal hole saw (19mm-57mm)	\$95
2Pce No.2 Morse Taper Reamer Set (Coarse & Fine)	\$65	12Pce Center Drill Set (1mm-5mm)	\$55
2Pce No.3 Morse Taper Reamer Set (Coarse & Fine)	\$75	10Pce Wad Punch Set (5mm-32mm)	\$65
2Pce Tapered Reamer Set (1/8"-1/2", 1/8"-5/8")	\$50	10Pce Wad Punch Set (3/16" - 1.1/4")	\$65
11Pce Adjustable Hand Reamer Set (9.25mm-26mm)	\$415	6Pce Glass Drill Set (1/8" - 1/2")	\$30
Carbide Circular Cutter (30mm-300mm)	\$195	20Pce 1/8" Shank Diamond Point Set	\$20
9Pce 1/4" Shank Carbide Burr Set	\$195	10Pce 1/4" Shank Diamond Point Set	\$25
6Pce 90 degree Countersink Set (8mm-25mm)	\$125	10Pce 1/16" Shank Micro Diamond Rotary Burr Set	\$15
7Pce Cap Screw Counterbore Set (M3-M12)	\$145	50Pce 1/8" Shank Diamond Rotary Burr Set	\$95
3Pce Stepped Drill Set (4-12mm, 6-20mm, 6-30mm)	\$155	3Pce 1" x 3" Diamond Hone Block Set (C.M.F.)	\$25
13Pce Keyway Broach Set (1/8"-3/8")	\$650	2Pce 1/4" Shank Diamond Hole Saw (1/2" & 1")	\$25
9Pce 1/2" Shank Woodruff cutter (1/2"x1/16"-1.1/4"x3/8")	\$420	5Pce Diamond Coated Rotary Drills (No. 36,50,54,56,60)	\$15
6Pce Straight Shank T-slot cutter (1/4"-3/4")	\$420	4Pce Diamond Coated Rotary Drills (1/16" - 1/4")	\$15
10Pce Straight Shank End Mill Set (3mm-20mm)	\$150	8" Flat Diamond File	\$40
20Pce Threaded Shank End Mill Set (3mm-20mm)	\$295	5Pce 5x180x50mm Diamond Needle Files	\$15
6" Slot Angle Plate	\$75	10Pce 3x140x50mm Diamond Needle Files	\$20
Deburring Tool	\$18	10Pce 3x140x25mm Diamond Riffler Files	\$20

ZG Pty Ltd

10/6 Scania Court, Gepps Cross, SA, 5094, Australia

Tel:0417802373, Fax (08)8449 4771, E-Mail: Zgmacho@AOL.COM

ISSN-0819-4734

Publisher: Australian Model Engineering Pty Ltd.

ACN 008 627 825

Australian Model Engineering is published six times per year at two-monthly intervals. January is the first issue for the year.

Subscriptions

An annual subscription to AME costs just \$38.00 (incl. GST) within Australia. NZ is AUD\$47; all other countries, AUD\$58 air. You can pay by cheque, money order, or overseas bank draft. You can also use your Bankcard, MasterCard or VISA credit card. All Mail to:

PO Box 21, HIGGINS,
ACT, 2615, AUSTRALIA
Phone/Fax : (02) 6254 1641 or
+ 61 2 6254 1641 from overseas

Copyright

All rights reserved.

Articles and drawings may be reproduced by the individual purchaser for his or her own personal use only. Otherwise, no part of this publication may be reproduced, copied, lent or re-sold without the prior permission of the publisher.

In keeping with the Copyright Act 1968, AME's standard policy is that copyright in articles, photographs and other graphical material is shared by Australian Model Engineering Pty Ltd and, respectively, the author: the photographer; and (jointly) the persons who sketch the original graphics and draught them for publication. This may be varied in an individual case by written agreement with AME. A fuller description of the policy is available from AME.

It is the author's duty to obtain permission for reproduction of somebody else's copyright material. Intending authors should consult AME in case of doubt.

Indemnity

Australian Model Engineering Pty Ltd or any of its principals are not responsible for the goodwill, quality of product, accuracy of information, service or the actions of advertisers appearing in this magazine. Any statements made or information given does not express or imply any warranty or endorsement of any product.

Printing and Distribution

Proudly printed in Australia for the publisher by Pirie Printers Pty Ltd, 140 Gladstone Street, Fyshwick ACT 2609

Australia Post Print Post Approved.

Publication No. PP228582/00001

Distribution is by subscription, through hobby supply houses and related-interest sales outlets worldwide, and also by Gordon and Gotch Limited through newsagents in Australia.

North American agent:

Wise Owl Worldwide Publications
1926 S. Pacific Coast Highway, Suite 204
Redondo Beach, CA 90277
Telephone: 310-944-5033

ADVERTISING DEADLINE

Please have your space for
November-December 2002
issue booked by:
Thursday 19 Sept 2002

September-October 2002

Issue 104

Contents

- 5 Comment
- 11 A Simple Digital Train Speedometer and Odometer
- 14 Mini Travelling Steady Rest
- 15 Making Injectors — part 3
- 19 Suitable Soluble Solutions
- 20 A Tasmanian Steam Safari
- 26 *Frank Curry* — A Dual Gauge Diesel Locomotive
- 28 Steam Chest
- 33 Fabricated Vacuum Brake Cylinders
- 35 Vacuum Check Valve
- 36 Ryan's Stirling Cycle Engine
- 37 Tracks 'n' Trees
- 39 Back Issues
- 40 Build Your Own Workshop Press
- 42 Clare Valley Model Engineers
- 44 Wollongong's Famous Hot Pot Run
- 46 Traction Action
- 48 A New Standard in Diesel Locos
- 49 Hamilton Open Weekend — March '02
- 50 A Simple Rail Scrubber
- 51 Club Roundup
- 56 Coming Events
- 57 Edge Finders
- 58 New Subscription Form
- 59 Letter Box
- 61 Small Rotary Engine Drives a Generator
- 62 News Desk
- Classifieds

Front cover

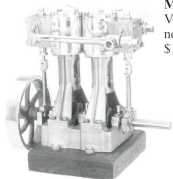
The Bush Mill Railway's 15" gauge replica of the world's first Garratt locomotive, TGR K1 simmers in the sun at the Bush Mill Station in April 2002. To see more of this railway and steam in Tasmania turn to page 20.

Photo: David Proctor

Miniature Steam Pty Ltd

Miniature Steam Pty Ltd is offering for the first time fully assembled engines.

**Bringing the highest standards to
Model Engineering**



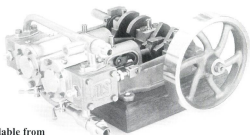
Mildura
Vertical double cylinder
non reversing
\$1430.00

Castings and fittings have been machined using the latest CNC machinery to achieve the highest standard in finish. The bronze castings have a glass bead satin finish while the rest of the fittings are polished brass and copper. The prices are guaranteed until December 2002 and include GST.



Echuca
Vertical single cylinder
non reversing
\$830.00

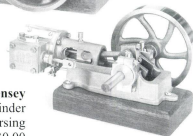
Gem
Horizontal
Double cylinder
non reversing
\$1430.00



**Available from
Mail Order**
Miniature Steam Pty Ltd
P O Box 840
Mulgrave 3170
Victoria

Victoria
Live Steam Supplies
26 Durham Road
Kilsyth VIC 3137
(03) 9723 9722

Pevensey
Horizontal single cylinder
non reversing
\$830.00



Meteropolitian Hobbies
424 Station Street
Box Hill VIC 3128
(03) 9890 1144

Queensland
Maddco
46 Industrial Ave
Toowoomba QLD 4350
(07) 4634 5622

Trade/Dealer enquires welcome – write to the mail order address above

Melbourne Society of Model & Experimental Engineers

Invite you to the

6TH MODEL ENGINEERING EXHIBITION

on the weekend of
5th & 6th October 2002

At the ENGINEERING HALLS, MONASH UNIVERSITY
WELLINGTON ROAD, CLAYTON, VICTORIA

**An open invitation to exhibit your models,
even if incomplete they will be of interest.**

We encourage all types of model engines:
hot air, steam & I.C., loco's, traction engines.

Also workshop tools, boats & planes,
trade stands, and more!

Meet old friends and make new ones!

For more information or to register your exhibit, contact:

The Secretary: Ian Stewart, 11 Kirkwood Drive,
CAMBERWELL, VIC 3124, ph: (03) 9889 7907

or

Robert Jones - phone: (03) 9801 6048,
fax: (03) 9801 6043

MODEL STEAM LOCOMOTIVE SERVICES

COMPLETE MACHINING. WELDING.

FABRICATING SERVICE.

Conventional turning and milling.

CNC turning and milling.

Small component small production runs.

Tig welding: stainless steel, aluminium, mild steel.
Silver brazing: copper, brass, bronze, stainless steel.

Tube bending service available.

Full construction of model engines and
locomotives.

Engineering solutions for model engineers.
All gauges and scales.

High Vacuum Technologies P/L

F 1/8 Eastgate crt. Wantirna Sth. Vic. 3152

Ph: (03) 9800 4886 Fax: (03) 9800 4588

<http://www.ameng.com.au>

Crew

Managing Editor

David Proctor

Phone & Fax:.....(02) 6254 1641
(phone: leave message before 3pm)
e-mail:.....amemag@bigpond.com

Articles and contributions:
PO Box 21, Higgins ACT 2615

Contributing Editors

Brian Carter, Dave Harper, Clive Huggan

Editing Assistance

Murdoch Findlay, John Oliver

Draughts

Dave Adams, Craig Belcher, Jim Gray,
Peter Hall, Clive Harwell, Rod
Heslehurst, Peter Kerville, Peter Manning,
Peter O'Loughlin, Rex Swensen

Typing and Distribution

Phyl Oliver

Contributors

Valerie Clark, Ted Crawford, Peter Dawes,
Allan & Claire Douglas, David Dunnett,
Barry Gerdes, Dave Giles, Chris Hollands,
Peter Johnson, Peter Lukey, Lindsay
McDonnell, Jack Miller, Ryan
O'Halloran, Brian Smith, Don Springbett,
Jack Stanbridge, David Wescombe-Down

Advertising

Brian Carter

Phone:(02) 4884 1205
Fax(02) 4884 1215
e-mail:.....brian@ameng.com.au

Subscriptions

Mandy Proctor.....(02) 6254 1641

Back Issues and AME Retail

Phyl and John Oliver

PO Box 1403
Tuggeranong ACT 2900
Ph/Fax(02) 6292 1938
email: jpoliver@webone.com.au

AME Local Representatives

Western Australia

Doug Baker(08) 9341 1630

South Australia

John Wakefield (08) 8362 3269

Victoria

Bill Taylor(03) 9458 3404

Tasmania

Jim Gray (03) 6394 7124

Queensland

Dave Harper(07) 3261 1140

New Zealand

Murray Lane(09) 534 8396

NSW and ACT

Contact the Managing Editor

Deadlines for issue 105

Club Roundup Sept 13
Letter Box Sept 13
Classified Ads Sept 27
Mailout Date Oct 24

Comment

Insurance — should we panic?

Since the end of last year, it does not seem to matter where one goes, the topic of conversation very quickly moves to insurance and particularly public liability insurance. We are all aware of the dramatic increases in premiums that the insurance industry has chosen to inflict on all and sundry including community and hobby organisations. These spiralling costs are the direct result of the ridiculous damages payouts being awarded by the courts in recent times, like the chap awarded massive damages against a council because he was injured swimming in an unpatrolled and known to be dangerous beach, because they did not have some means in place to prevent him from doing so!

I am sure we have all heard stories of at least one organisation which, unable to afford the premium has been forced to 'close up shop'. Some of these stories are true, some are exaggerated and some are plain false. As an example, I read in a newspaper from interstate that the Canberra club was being forced out of the ACT because of insurance costs. As President of that particular club I know this to be incorrect — there is a problem with occupancy because of the government's plans for the use of the land the club occupies, but this has nothing to do with insurance, which would cost the same wherever we operated.

With two or three exceptions all clubs in Australia belong to the AALS brokered group insurance scheme and to date this would appear still to be the best value for the model engineering hobby. The premium increase for this year was quite moderate compared to what some companies are doing, and I have been informed that this directly relates to our overall level of safe operation and minimal claims. Whether this will continue to be the case is unknown. In the present climate it would be prudent for clubs who are in the group scheme to stick with it, partly because it appears to offer more stability at present and partly because each time a club drops out it will increase the cost to the clubs who remain (known as economies of scale).

The system by which people can sue for damages in this country is far from perfect and one which I expect most of our North American readers would be familiar with. Perhaps what our political leaders should be doing is taking a leaf out of the New Zealand book. The Kiwis have a body called the Accident Compensation Commission (well, that's what it was called when I lived there) which operates in much the same way as our Medicare system, in that all taxpayers contribute to it and it sets the compensation levels and makes payment. The system is free of the court system and consequently NZ should not have the public liability circus which we endure.

For the present, the best advice is to treat any 'scaremongering' type stories with a degree of scepticism, remain calm and concentrate on doing everything the right way, the safe way!

David Proctor

Join us in a great hobby!

If this is your first issue of *Australian Model Engineering*, welcome!

In successive issues we cover many topics centred on that wonderful process of model engineering — alias *tinkering*.

If you're new to model engineering as well as to our magazine, you'll benefit from getting together with other model engineers — we're good at sharing ideas and saving each other money! If you don't have any contacts, start by looking in Club Round-up to find a club that's near to you. Many of our readers have discovered people with similar interests literally just around the corner.

Helping other model engineers is the simple idea of the volunteers behind this magazine. Our readers write items for us — for the same (non-existent) rate of pay! If you have ideas, opinions or techniques that you feel would be interesting to others (especially from the newcomer's angle), please drop us a line. We can send you a useful guide and help with preparing artwork or editing.

I hope you'll enjoy the great fellowship that makes our hobby special, and that you'll support our advertisers — after all, they help pay our bills!

David Proctor
Managing Editor



E. & J. WINTER Present...

The NSWGR Z12 class 4-4-0 locomotive in 5" gauge

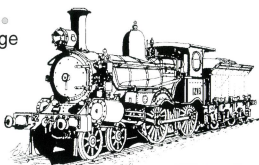
Award winning examples of this elegant little 19th century locomotive can be found on many club and private tracks around Australia. This includes the engine featured in AME magazine No.61, a great credit to her novice builder. Suitable for first-time builders or experienced locomotivists looking for an intrinsically simple design. Light-weight and small size makes a readily transportable 5" gauge locomotive.

For casting list and prices please write, fax or phone: **E. & J. Winter**

PO Box 124, MEDOWIE, NSW, 2318

Phone & fax: (02) 4981 7999

e-mail: ejwinter@ozemail.com.au



Z12

Send for our 44 page illustrated handbook just \$7.00 (inc GST) posted.



Argyle Locomotive Works

Gauge One Steam Locomotive Engineers

Flying Scotsman Gresley A3



The worlds most famous locomotive in Gauge 1, 3 cylinders, Holcroft/Gresley valve gear, spirit fired, L.N.E.R. livery, corridor tender.

Ph/Fax Intl: 61-359-686573. Natl: 0359-686573.

E-Mail: argyleloco@mail.thills.hotkey.net.au

241 Belgrave-Gembrook Rd. Clematis, 3782 Australia

www.argyleloco.com.au

Arrival in July/November 2002.
Reservations required for delivery.
Indicative Pricing \$9600-\$9800



G.1 & G.O. Live steam locomotives. Standard and narrow gauge types. Assembly kits and Ready-to-run. Valuations for disposals/sale items.

A NEW PARTING TOOL

Features

Mounts on the front of the tool post

but cuts like a rear mounted tool.

Tool has less tendency to dig in.

Blade incline makes height setting easy.

Designed to fit most 5" - 6" centre height lathes.

Cutting blade standard 3/32" x 1/2" (Eclipse or P&N)

NOT for use with screw-on chucks. Lathe must have

lock-on chuck and reverse capability.

Resharpener

Simply sharpen the end face and

occasionally along the length of the

cutting edge.

Size: Shank 90 x 13 x 14mm

Price: \$98 incl GST and mailing
(Blade not included in price)



Ideal for lathes with
12mm - 16mm tool height

D & P BURKE

27 Woodstock Rd.

Mount Waverley, 3149,

Victoria

Phone (03) 9807 6316

Fax (03) 9807 9620

We accept Bankcard,

VISA and MasterCard

Lake Macquarie Live Steamers are turning

50

21, 22 & 23 February 2003

So join in our weekend of celebrations

Enquires to: Joe Huntley 02 4954 0358



Track: Off Velinda St, Edgeworth.

Mail: PO Box 4040, Edgeworth

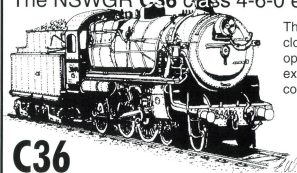
NSW 2285

E-mail: lm1sls@hotmail.com

Web site: lm1sls.tripod.com/index.htm

E. & J. WINTER Present

The NSWGR C36 class 4-6-0 express passenger locomotive in 5" gauge



C36

This locomotive model is a heavy and powerful passenger mover! This close scale design has produced many award winning examples operating on tracks around Australia. Although recommended for experienced model builders, many successful engines have been constructed by novice builders.

For casting list and prices please write, fax or phone:

E. & J. Winter

PO Box 124, MEDOWIE, NSW, 2318

Phone & fax: (02) 4981 7999

e-mail: ejwinter@ozemail.com.au

Send for our 44 page illustrated handbook just \$7.00 posted.

Knowledge, Information, and Pleasure, FOR SALE!



How to Design and Make AUTOMATA [Addams] £17.45

Brilliant book on the principles and design considerations of making relatively simple automata, although the principles could be extended to more complicated versions. Essentially intended for teenagers taking DT at school, the models envisaged are built largely of wood, cardboard etc, but could be built in metal. No specific designs, but loads of ideas and clear instructions on how to make things move. 80 page landscape format paperback, choc-a-block full of illustrations.



TRACTION ENGINE Design & Construction 1900-1930 [Gilbert] £41.50

One of the best traction engine books we have seen - every traction engine owner, modeller or armchair enthusiast should have a copy on their bookshelves.

In the 342 pages of this hardbound book Geoffrey Gilbert looks at every facet of how traction engines were built and how different makers' practices differed. The major components such as boiler, cylinders, wheels etc figure strongly, but all parts are covered down to the firing tools, spark arrestors, lamps and items such as tube expanders, cylinder boring and slide valve facing machines. An encyclopedic book enhanced by well reproduced photos, makers literature, and excellent drawings, many from the author's own hand. It doesn't concentrate on one maker, but reviews the practices and products of all the major British makers; all types of traction engine, tractor and road roller, but not steam wagons are included. *Highly recommended - send for a copy today!*



Burrell Style 1900 - 1932 [Gilbert] £32.50

Back in print, this is Geoffrey Gilbert's masterly treatise on Burrell style, or possibly practice, when the firm was at its height. There is just too much to summarise here, but there are few stones the author has left unturned, and the book is chock-a-block with good drawings, photos and other information. This is a book every model traction engine builder must have.....265 page hardback.



The Tiffeld Thunderbolt [app. 85 mins] £11.40

The Maggie [app. 88 mins] £13.10

The Iron Maiden [app. 88 mins] £13.10

Three films on video from the golden age of British comedy, with strong mechanical connections. The top two are *Ealing* comedies from the 1950s, the first and best known telling the story of villagers preserving their own railway, the second being a lovely film about a Clyde "Puffer" and her crew, and what befalls an American tycoon who accidentally entrusts a cargo to their care. The third, dating from the 1960s, is the story of an aircraft designer and his beloved *Fowler* Showman's engine, and the various disasters that happen when an (again American) tycoon and his family come to inspect his latest design. All three films are guaranteed to bring a smile to your lips!

Prices shown INCLUDE Airtainer delivery to Australasia



CAMDEN MINIATURE STEAM SERVICES

BARROW FARM, RODE, FROME,
SOMERSET. BA11 6PS. U-K

24 hour phone: 0011 441 373 830151

Fax: 0011 441 373 830516

Website: www.camdenmin.co.uk



More Details on our Website:

www.hobbymechanics.com.au

Suppliers of Machinery
and Tools for Working in
Metal and Wood



Budget Bogies



Based on
Queensland
Government
Railways
Design

Item	7 1/4" Gauge	5" Gauge
Bogie Frames, Aluminium	\$65.50 set	\$37.90 set
Axleboxes C.I. One stick	\$12.50 ea	\$8.20 ea
Wheels	\$25.30 ea	\$10.80 ea
Springs, set of 8	\$24.00 set	\$22.50 set
Complete set of parts	\$330.50 set	\$185.95 set
Ready to run, anti-friction bearings	\$445.50 set	\$335.95 set

Please add 10% GST to the above prices

JOHN STRACHAN

HOBBY MECHANICS

P.O. BOX 785, KENMORE QLD 4069 • Phone (07) 3374 2871

• Fax (07) 3374 2959 • E-mail: jstrach@powerup.com.au

For your
MODEL ENGINEERING
requirements...

MATERIALS

Copper, brass, B.M.S., stainless,
silver steel, in most shapes and sizes.

FASTENERS

Screws, nuts, rivets.

TAPS & DIES

BA, ME, Brass

FITTINGS

Injectors, gauges, valves, etc.

MACHINERY

A good range of pre-loved workshop
equipment. New machinery also available.

A range of books and magazines are in stock.



EMCO MACHINE TOOLS AUSTRALIA PTY LIMITED



2/247 Rawson Street
Auburn, NSW, 2144
Australia

Phone: (02) 9648 4377
Fax: (02) 9648 4150
ACN 002 506 139



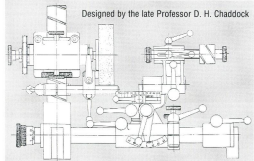
Hobby Mechanics

More Details on our Website:
www.hobbymechanics.com.au
**Suppliers of Machinery
 and Tools for Working in
 Metal and Wood**

By agreement with Model Engineering Services, Sheffield, UK, we offer components to build the world-famous

QUORN UNIVERSAL TOOL AND CUTTER GRINDER

Designed by the late Professor D. H. Chaddock



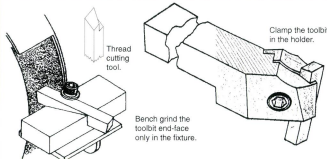
Perfect for the correct sharpening of milling cutters, lathe tools and drills, etc. We offer Australian-made castings combined with imported accessories. Both Mark I and Mark II styles offered. Please send S.A.E. for Details and Prices.

JOHN STRACHAN

HOBBY MECHANICS

P.O. BOX 785, KENMORE QLD 4069 • Phone (07) 3374 2871
 • Fax (07) 3374 2959 • E-mail: jstrach@powerup.com.au

THE DIAMOND TOOL HOLDER

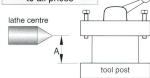


Each kit consists of the toolholder, grinding fixture, Tool Bit, Allen key and detailed instructions.

Type	L.W.H.	Dim A	Sq. tool bit	Price	Postage
T6	52 x 9.5 x 9.5	6mm (1/4")	1/8"	\$84	All types:
A8	77 x 12 x 11.5	8mm (5/16")	1/4"	\$108	A\$7
A9.5	77 x 12 x 13	9.5mm (3/8")	1/4"	\$108	in Aust
B16	77 x 14.3 x 15	16mm (5/8")	1/4"	\$108	& NZ

Roughing and finish cuts, end and shoulder facing, plus 55 or 60 degree threading. All from a standard square HSS toolbit! Before ordering, measure the height from the tool-rest landing to the lathe centre (Dim A on sketch). Select the kit that suits your application.

Please add 10% GST to all prices

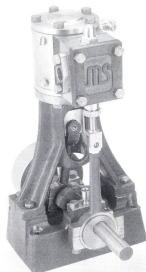


D & P BURKE TOOLMAKERS

27 Woodstock Rd. Mount Waverley, 3149, Victoria
 Phone (03) 9807 6316 Fax (03) 9807 9620
 We accept Bankcard, VISA and MasterCard

Exclusive to Live Steam Supplies

Miniature Steam Pty Ltd are offering a limited number of fully assembled and tested preproduction prototype models of the Mildura and Echuca steam engines for sale exclusively through Live Steam Supplies.

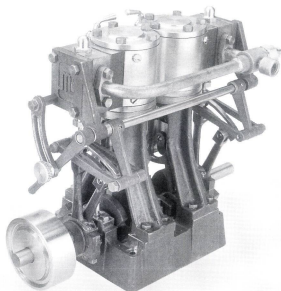


Echuca

(Single cylinder vertical)
 Non reversing \$550.00
 Reversing \$650.00
 Plus P & P

Mildura
 (Twin cylinder vertical)
 Non reversing \$1050.00
 Reversing \$1150.00
 Plus P & P

***Ask us about our boiler kits
 suitable for these engines***



Contact:

Live Steam Supplies
 26 Durham Road
 KILSYTH, VIC, 3137

(03) 9723 9722
 (03) 9733 0681 Fax

OVERSEAS ORDERS WELCOME

Visa and Master card welcome

International 61 3 9723 9722
 International 61 3 9733 0681

MODEL ENGINEERING SUPPLIES

A CN 064 886 924

We supply a wide range of Model Engineers supplies

- TAPS and DIES:** . . . British Association. Model Engineer, Brass.
- FASTENERS:** BA Screws, in Standard and Small Hexagon, Cheese, Round and Countersunk heads, Nuts, Washers and all-thread. Rivets, Pins.
- MATERIALS:** Copper, Brass, Bright Mild Steel, Stainless Steel, Silver Steel, Cast Iron, Gunmetal, Bronze, Spring Steel in all shapes and sizes.
- FITTINGS:** Injectors, Pressure Gauges, Valves, Water Gauges, Pumps, Whistles, Plumbing Fittings, Lubricators, Drain Cocks.
- MISCELLANEOUS:** O-rings, Gauge Glass, Stainless Balls, Gland Packing, Springs, Tube Brushes, Filter Gauze, Laser Cut Frames.
- CASTINGS:** Simplex, Blowfly, VR K and J Class, Sweet Pea, Sweet William, Meter Maid, Tapping Tool, Quartering Jig, Angle Blocks and more.
- DRAWINGS:** Locos, Tooling, Stationary Engines, Traction Engines.
- ROLLING STOCK:** Kits for VR T Van, GY Wagon Petrol Tanker, Auto Couplers, Wheels, W Irons, Axle Boxes, Buffers and Hooks.



We offer a very friendly and efficient service.

For a FREE Price List write, phone or fax:

Wayne Roberts

7 Reeves Close, Tullamarine, Vic, 3043

Phone: (03) 9338 7368 Fax: (03) 9330 0840

CREDIT CARDS WELCOME

Internet: <http://www.mesupplies.com.au>

e-mail: wayne@mesupplies.com.au



LIVE STEAM MODELS Fittings, Fasteners & Supplies

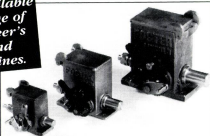
Offering a comprehensive range of model engineering materials:- • Valves • Water & Pressure Gauges

- Displacement Lubricators
- Injectors • Foster Lubricators • Oilers & Grease Cups
- Whistles & Sirens
- Unions & Nipples
- Rivets, Screws, Bolts.



Catalogue available with full range of model engineer's supplies and traction engines.

Send \$10 Australian Dollar bills (or Credit Card details) to:



Live Steam Models Ltd., Unit 7, Old Hall Mills, Little Eaton, Derbyshire DE21 5DN England.
Tel: 44-1332-830811 Fax: 44-1332-830050
E-mail: livesteammodels@zetnet.co.uk
Web Site: www.livesteammodels.com

Put it on your calendar

now!



Great fun! 5" and 7 1/4" track in scenic surrounds.
Traction engines! Stationary models! Full-size historic engines! HO scale layout! Loads of tourist attractions!

enquiries: David Font on (02) 6921 4762

e-mail: dfont@tpg.com.au

HAFCO Workshop Equipment

AL330A GEARED HEAD LATHE



- 6" Centre height 36" centres
- 9 speed 240volt
- Weight 380kg
- Accuracy guarantee
- Exceptional value

\$3350

PRICE INCLUDES

2 chucks, faceplate, steadies, drill chuck, splash guard and stand

HM30 MILL DRILL

- H/Duty 2HP 240V TEFC motor
- Weight 300kg
- 3mt spindle
- Chuck and vice supplied
- Table 810mm x 240mm



OPTIONAL STAND \$299

\$1590

FREE!

PRICED 2002 COLOUR CATALOGUE OUT NOW. RING, WRITE OR FAX

ANGLE PLATES

QUALITY CAST IRON



112 x 88 x 75mm	\$64 (M242)
150 x 125 x 112mm	\$86 (M243)
200 x 150 x 125mm	\$152 (M244)



HAND SHEARS

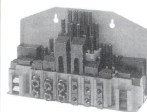
- H/D steel fabricated
- Quality Hardened blades
- Spring return handles

HS6 - \$149 (S186)
44 x 4.75mm FLAT capacity

HS12 - \$189 (S188)
48 x 4.75mm FLAT capacity

CLAMP KITS

- C090 3/8" BOLT \$139
- C091 1/2" BOLT \$149
- C092 5/8" BOLT \$179



ROTARY TABLES



- Horizontal or Vertical type
- Calibrated rim and micro vernier
- Scale dial
- Disengaging hand wheel
- Adjustable backlash

OUTSIDE DIAMETER	PRICE
150 (6")	\$389
200 (8")	\$575
250 (10")	\$695
300 (12")	\$875

DIVIDING HEADS

- Hardened & ground spindle & worm
- Ratio 40:1
- Can divide direct or indirect
- Head tilts to 90°



100 (4")
\$529 (D001)

125 (5")
\$729 (D002)

BENCH DRILL

- 240 Volt ● 3/4HP
- 16-speed with 16mm chuck
- 1m High

\$289

(D138)

Pedestal Model \$339

(D140)



AUTO PARTS WASHER

IDEAL FOR MOTOR TRADE

- Large 90litre solvent capacity
- 240 Volt pump gives output of 220 litres per hour
- Tank 760 x 540 x 310mm
- Weight 35kg

\$185

(A368)

- Small bench model **\$89** (A370)

MEASURING EQUIPMENT

M045	Imperial dial gauge 0-1"	\$45
M046	Metric Dial gauge 0-10mm	\$45
M050	Magnetic base	\$49
M720	6"/150mm Std Vernier	\$35
M725	8"/200mm Fine Adjust Vernier	\$45
M740	6"/150mm Digital Vernier	\$89
M742	8"/200mm Digital Vernier	\$115
M743	12"/300mm Digital Vernier	\$174
M760	0-1" Micrometer	\$30
M770	0-25mm Micrometer	\$30
M016	0-100mm Micrometer set	\$119
M046	0-4" Micrometer set	\$119

○ **Mini Speedway cars**
FREE demonstrations, Welding, Woodturning, Woodslabbing, and much more

**OPEN ALL WEEKEND
DON'T MISS OUT ON OUR
SPECIAL ONCE A YEAR SALE!**

.... call us for special show prices on all HAFCO products

**SYDNEY ANNUAL
4-DAY SALE!!
NOV 7-10, 2002**

NOTE: WA prices may be higher due to freight costs

HARE & FORBES
MACHINERYHOUSE

established 1930

SUPPLIERS OF NEW & USED MACHINERY AND WORKSHOP EQUIPMENT

HMC
Herless Machinery Corporation

established 1910

NSW: 1/2 Windsor Rd, NORTHMEAD 2152
Ph: (02) 9890 9111 Fax: (02) 9890 4888

QLD: 550 Kessels Road, MACREGOR 4109
Ph: (07) 3849 1888 Fax: (07) 3849 1414

VIC: 2099 Princes Highway, CLAYTON 3168
Ph: (03) 9562 8866 Fax: (03) 9562 8329

WA: FLORA MACHINERY SALES
363-385 Sevenoaks Street, CANNINGTON 6107
Ph: (08) 9356 1811 Fax: (08) 9451 1323

A Simple Digital Train Speedometer and Odometer

By Peter Dawes

Summary

A cheap second hand treadmill computer is used to make a battery powered self-contained LCD speedometer/odometer. A design is presented for a totally portable, two-wheel truck to carry the whole works. With wheels turned to exact diameter, no calibration or correction factor is required. With insurers now dictating more and more how we function, a speedometer is going to become an essential accessory.

Discussion

The desirable features of any speedometer are that it is digital rather than analogue (for precision and accuracy); that it is stable and easy to calibrate; that it has a good display and is easy to power in a loco; and that it is simple to make and is low in cost. Speed measurement is the primary requirement but it would be desirable if it could also measure distance.

Bill Abbott presented a design for a simple speedometer based on a bicycle "speedo" in *AME* in 1997. Another design was published by Ron Heller in *Live Steam* in 1999 and another design was by Ken Metcalfe in *ME*.

Bicycle speedos do have one potential advantage. To cater for different wheel diameters they have some method of calibration. Their display however is small and cluttered.

The basis of this one is a small, totally self-contained battery-operated speed/distance/time computer from a second hand treadmill or so-called 'walking machine', and it should be possible to find one of those in the local recycling shop or second hand market. The computer usually only needs new batteries and should be OK unless someone has smashed the LCD. It is usually the belt or platform surface that deteriorates. A working treadmill should cost less than \$50 and a non-working one, maybe \$5 or \$10. That fulfils the cost requirement. The advantage of the treadmill computer over the bicycle version is a larger clearer display. That fulfils the display requirement.

The main reason why so many treadmills end up in wrecker's yards is that the non-motorized types are not really satisfactory. I have restored a discarded machine and fitted it with a variable speed drive to make it truly effective, but that is another story. A second reason is that they are not properly looked after and grit gets under the belt where it ruins the surface of the platform. Then the belt does not slide smoothly. If that happens all you can do is throw it away.

The treadmill can be almost a total wreck as long as you can rescue the computer unit, the little two-core (flat twin) wire cable, the sensor, and possibly the magnet off the flywheel of the drive roller, although magnets are readily available. The cable will be something over a metre long and may have been broken but can be rejoined with a mini plug and socket. It connects the sensor on the frame near one end of the drive roller and then passes up inside the column to connect to the computer mounted on the top panel. Some cables are wired in permanently. Others have a mini coaxial plug, which is more convenient. In fact I recommend fitting a plug and socket joiner if none is present already. Then you can insert an extension cord to allow the computer unit to be taken off its truck and used remotely.

What's the catch?

The treadmill computer has a nice big display, but yes — there is one problem. There is no way of altering the calibration of this little device, so that if we want the display to indicate true speed or distance we MUST use a wheel diameter of 2.36 inches (or whatever the diameter of the drive roller was on the treadmill, and most that I have come across were 2.36 inches). In fact, that

is not a real problem. Not being able to calibrate it is an advantage in one sense. You cannot get into trouble with calibration later.

Once a place is found to mount the sensor unit, the rest is easy. You can use any wheel on the loco that you can screw the small magnet onto or can drill a hole to embed it in, in the case of a disc magnet, or you can use a separate jockey wheel as long as it is rolling on the rail (or road), and is 2.36" in diameter. If it's some other diameter you need to apply a correction to all the readings. A colleague suggested using an 0.2 inch pitch toothed belt from an old printer to drive a wheel at the correct ratio to display correctly. This allows use of any wheel on the loco as long as the correct pulley ratios can be achieved. Clearly, this means it is a dedicated device and implies a lot more work but it can then be a permanent feature of that particular loco.

Alternatively, I have designed a small towable 'pony truck' with the correct wheel diameter to carry the unit complete with display and sensor units. That makes it instantly portable between trains and it does not require calibration or the use of a correction factor.

Correction for belt thickness

To be strictly accurate it is necessary to add a small amount to the wheel diameter to correct for the original treadmill belt thickness. Therefore allow a tolerance of minus 0 plus 15 thou on the wheel diameter. The pitch circle plane when used on the treadmill is the plane of the fabric layer, so that the true pitch diameter would have been outside the OD of the roller/wheel by about one thickness of the belt (about 1mm or 30 thou) given that the total belt thickness is only about 2mm. If the designers of the treadmill did their calculations accurately they would have allowed for this when programming the computer. We don't know if they did or not. Therefore, I have settled on a diameter of 2.375 inches (2 3/8"), which is likely to be a stock tubing size.

Any wheel can be used even if it is much larger than 2.36" provided one is prepared to apply the correction factor to all speed and distance readings. That isn't a problem for one-off special readings, but would be a nuisance for regular use. The factor required is simply the ratio of the actual wheel diameter (WD) to 2.375. That is, we would multiply the distance and speed displays by WD/2.375.



Top view — display panel

Miles per hour

The 2.36" diameter wheel is quite small and most rolling stock will have wheels at least 3" in diameter. If users want miles per hour instead of km per hour then a wheel exactly 3.8" (3.798) in diameter will read miles and mph (1.6093 x 2.36). However the display annunciation cannot be changed to show 'mph'. In fact, it turns out that the kilometre wheel is so small that there is barely sufficient room to attach the original magnet. So I found that a small disc magnet 0.5" diameter x $\frac{1}{4}$ " thick from Tandy, who sell it in packs of 3 for 50 cents, was easier to fit and a better proposition. Just drill a half-inch hole in the side of the wheel as far from the rim as possible and push the magnet into it so that it is flush to the surface. It may pick up small particles of iron from around the track but these can be removed periodically.

Note that the wheel can also be a single wheel mounted on a sprung swing-arm, holding a fixed axle and located between any two normal wheels where it will not need a flange (as long as the tread is wide enough). It does not drive anything and can be left permanently in place because it imposes no load on the machine. In the case of a road vehicle, it would not have a flange anyway. The tread should be parallel, not tapered.

The pickup is a tiny reed switch potted in a plastic case that is screwed onto the loco frame somewhere close enough to be triggered reliably by the magnet on the wheel. The maximum distance for reliable triggering depends on the magnet but is about $\frac{1}{4}$ " (6mm) and it should not be surrounded by iron because the iron will draw the magnetic lines of force away and 'starve' the reed switch. So it can be screwed to iron but not surrounded by it.

That's all there is to it. It's not perfect because of the resolution of only one decimal place. If anyone finds a way to change the calibration please let us know, but I doubt if it's possible. Tweaking the crystal oscillator will not be enough.

Accuracy and testing

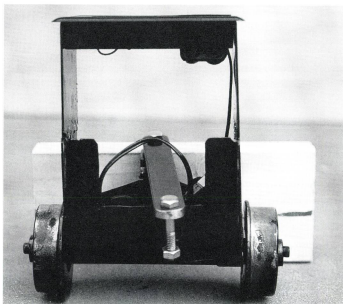
The finished speed should not require checking, and in any case it is unlikely that we will be able to measure speed or distance to an accuracy better than that of the original device given that it is crystal controlled and uses digital processing. But if users want to try to verify the readings, accuracy can be checked first by comparing the clock with a good stopwatch, and second, by testing its measurement of distance made on a long length of straight track whose length can be measured accurately. That fulfils the calibration requirement. The distance resolution is only 0.1km so it would be necessary to make a couple of runs and average them.

Note that on circular tracks, the circumference is π times the diameter so on a 5 inch gauge track if the sensor is fitted to an OUTSIDE wheel, the circumference is exactly 10π or 31.42 inches (0.8m) longer than the inside rail and it doesn't matter if the track wanders in and out or is not truly circular. This ought to mean that wheels fixed to a common axle would wear rapidly. Why they don't is another story. The exception comes when the track is a figure eight with a crossover so that one complete circuit involves traversing both loops once, then the inside and outside lengths are the same. This suggests perhaps, that if you want to equalize the wear on wheels, you should incorporate a figure of eight in your track. But that is another story also. So it doesn't matter whether the sensor is put on the outside or inside wheel as long as that 0.8 metre difference is recognized.

The device can be used to quickly and very easily measure the length of long complicated tracks quite accurately. It's no problem to make a couple of circuits to increase the accuracy and precision of the measurements.

Dividing total distance by elapsed time gives average speed. That can be compared with regular readings of instantaneous speed on the computer. Measurements on my treadmill showed that it was within 0 to minus 6% (i.e. it was reading low). The lack of precision is due to the difficulty of holding the speed exactly constant on some given figure since it reads to only one decimal place of kph. Two digits would have been better.

The system could be made the basis for some of the mea-



View through from back

surements needed for an efficiency trial. It could be used to measure the work done (actual travelling time and distance traveled) by a locomotive in an afternoon's running session. That is because the clock stops running whenever the loco is stationary. (It was to stop the user cheating on time when he was running on the treadmill. If he hopped off, the belt stopped and so did the clock! With the motorized version there is nothing to stop him hopping off and leaving the belt running. With the loco of course, you cannot cheat.)

As long as auto shutoff doesn't turn it off completely it can be used to keep an accurate record of actual hours for maintenance or other purposes. The measurements are bi-directional. That is, readings of speed are the same in both directions and distances are not subtracted if you go backwards.

Fault finding

A potential error in readings is the occasional failure of the reed switch to trigger. This will be due to the switch being too far from the magnet's path or having too much iron around it, or use of a very weak magnet.

The only other possible source of error is double triggering caused by using a bar magnet so that both poles are able to trigger the switch alternately. This is easily prevented by presenting only one pole of the magnet to the switch. For example, a button magnet is ideal because it can only present one pole. Its faces are of opposite polarity.

The pony truck

The simple, portable, two-wheel "pony truck" has 2.375 inch diameter wheels and carries the complete speedometer. This fulfils the ease of construction requirement. The pony truck is normally towed immediately behind the loco in the case of an electric or petrol loco, or behind the tender with the main tow-bar to the car behind passing through it in the case of a steam loco, but it can actually be placed between any two cars in a train or on the end. The total length of the new tow-bar is about 6 inches and that would be only about three inches more than would have been used originally. It should be clear in the drawing. The pony truck's own tow bar is put UNDER the main tow bar on the same coupling pin.

The wheels can be cut from steel plate, or fabricated - even using a slice cut from the original treadmill roller. They can be plastic or aluminium since there is no load to carry. Each wheel runs on a single 6201 bearing (dimensions 32 x 12 x 10mm) on 12mm shafts turned on the ends of a piece of 16 or 20mm square steel. Or the smaller 6001 can be used (28 x 12 x 8). Oddly, I found the 12mm bearing to be cheaper than the smaller 10mm bearing but the latter is also satisfactory. The axle is bolted up under the frame of the truck, making sure that the hole in the

coupling bar forms an isosceles triangle with the points of contact of the wheels with the track. That is necessary for good tracking.

If hitched behind the last carriage, a light duty two-way cable is needed to run the full length of the train up to the driver's position, and while quite feasible, it requires a plug and socket and care in managing the cable. Some cables already have tiny plug and socket connectors; others do not. Fortunately, the cable doesn't require electrical shielding because its signal is at low impedance. If wires are already installed to supply taillights then it could be incorporated with those. Or an observer on the last car could hold the computer to monitor the readings.

The pony truck as designed would not withstand a loco hitting it from behind. That sort of protection would require stronger construction with some form of buffering but the basic intention behind this design has been minimum size and maximum simplicity, so I make no apology for it.

Nevertheless some readers will still prefer something more realistic. While there is nothing to stop it being put into a model of a prototype piece of rolling stock, such as a guard's van or brake van, the downside is that it becomes a VERY much bigger job. Perhaps there is a special dynamometer car for measuring a loco's performance? I have an idea that the NSWGR had such a car.

'Legal' speed limits

With constraints on speed imposed by insurance companies, it is important that clubs have a means of measuring speed if only to educate drivers. I understand that this limit is 20 kph or about 12 mph. That is much too fast for 5 inch gauge and even 8 kph is too fast on curved track that is not banked. In the case of an accident involving members of the public, if a club has to admit that it doesn't even have a speedometer or any means of measuring speed accurately, it is bound to come off a very poor second in a court action. If the club does have a speedometer and has used it to educate drivers to get them accustomed to the maximum speed, it will be on much safer ground. We should set and display suitable limits on our track similar to full size practice.

It is obvious that a speedometer for this purpose would have to be of reasonable accuracy, be reliable, and stand up to scrutiny by independent assessors. This is where the digital principle of measurement as used here shines. An analogue system must be calibrated and that is not easy to do. This machine needs NO calibration as long as the wheel diameter is the same as the origi-

nal treadmill roller diameter.

If the sensor is fitted to a wheel on specific locos, there could conceivably be arguments about accuracy. In the case of the pony truck version, there can be no dispute because the wheel diameter is there to be measured. It is fully accessible, and nobody can manipulate the readings because the computer chip and its circuitry are not accessible to anyone short of a very competent electronics expert. If by chance the computer came from a treadmill with some different roller diameter, we would not know, so perhaps some basic check is required and the easiest way to do that is just run the loco alongside one towing a 'standard' speedo and comparing the readings. So having an independent vehicle remains the best way to standardize.

The computer

On my treadmills, branded "Stylemaster", the heart of the computer is an 18 pin dual in line IC, type HL8008 9506. I doubt if a circuit diagram exists because it would be regarded as non-repairable item and simply replaced. But someone might have a circuit. I know nothing about that chip. Chips are often designed and manufactured as proprietary parts for specific products.

The IC is soldered directly into the circuit board and has probably been electronically preprogrammed for the diameter of the drive roller so that that figure is permanently stored in its memory. If you want to experiment with it, remember that the IC is almost certainly sensitive to static electricity so that the usual precautions must be taken such as apply to computer circuit boards.

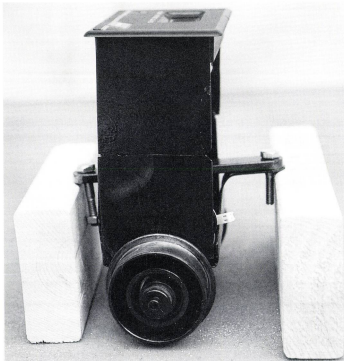
The display is an LCD 45 x 17mm with four 12mm high dig its. There's a tiny crystal oscillator on the circuit board so that we can safely assume that time and speed readings are accurate and free from drift. That fulfils the stability requirement.

There are three main modes of operation and which one is displayed is user-selectable at any time:

- 1. MODE** switch selects which of the modes to display, including Scan.
- 2. Distance** - in km; resolution 0.1km.
- 3. Speed** - in kph.
- 4. Elapsed time** - in minutes and seconds.
- 5. SCAN** - switches the display automatically from one mode to another in sequence about every three or four seconds. Meanwhile, the other functions continue to tick away in the background.
- 6. Kilocalories** - of no interest and not likely to be accurate anyway because the computer doesn't know what the slope of the treadmill is, and that obviously has a very big influence on the amount of work done. Some other functions may also be present - some computers have them, others don't.
- 7. Pulse** - Some devices have a separate input for this so the user can monitor his or her pulse rate while using the treadmill. We have no use for it here.
- 8. Reset** - Some computers have a reset button, others don't. To reset the latter type, simply turn them off then on again. That automatically runs an initializing program that leaves all the functions set on zero.
- 9. Tempo** - purpose unknown. It may be another version of pulse rate.
- 10. Auto shutdown.** Two of the computers I tried had auto shutdown after about 5 minutes of no activity. I dislike this feature on digital verniers, especially when I want to use it on the quill of the milling machine. Fortunately the Mitutoyo does NOT have auto shutdown. On the other hand, unfortunately, the Mitutoyo is the expensive one! On this computer, auto shutdown blanks the display but does not reset the computer nor turn it off completely. So it starts up again immediately pulses are received, and with the same accumulated distance readings it had when it shut down. That makes it suitable for cumulative measurements of distance and elapsed time. I cannot vouch for all computers.

"Conversion time"

Readings of speed require converting from period (time between pulses) to frequency (i.e. frequency is the inverse of period), and no reading can be made before at least two pulses have arrived. Therefore the computer takes a perceptible time to display a reading or a change in the reading. This is called the



Side view — mounted on pony truck

"conversion" time and is usually about 1 to 2 seconds. That's no problem in practice. If one used the alternative method of counting sufficient pulses to display a reading directly, it would take many seconds to get an accurate reading, especially as the pulse rate from the treadmill could be as low as 1 pulse per second. In almost all cases that method is unacceptable.

A dynamometer requires the addition of a strain gauge between the front and rear coupling bars. An article on dynamometry was published in *ME* in two parts by Don Cordall. A strain gauge system was described by the late Walter Shellshear. A new series on the theory and design of dynamometers has just started at the time of writing this article. It is by David Tompkins in the *Model Engineer*.

Unfortunately neither the treadmill computer nor the bicycle computer make provision for driving an outside circuit — such as another computer, or an illuminated display (LED), or for integrating with the drawbar pull device to measure horsepower or kilowatts. But it should be possible. After all, the Mitutoyo digital LCD vernier has provision for doing just that and is driven by a tiny button battery. But it's no mean feat to tap the output from the LCD drive and buffer it to drive another circuit. The output of the Mitutoyo is a series of pulses sent serially through a special (and unduly expensive) miniature 4-way cable available as an optional accessory. "Clocking" is required to define the start and stop of the train of pulses. This pulse train in "bit-serial" format is reconstituted into partial parallel format to produce the "byte-serial" data. Finally the serial bytes are combined into parallel bytes to drive a seven segment display or another device. Even then, seven segment display devices require another stage of decoding but many display units do that automatically and invisibly to the user.

So while I don't doubt it can be done, a dynamometer is not simple and it might be easier to make a dedicated dynamometer circuit from scratch with discrete CMOS ICs of the CD4000 series, using the same principle of detecting wheel revolutions with a magnet and reed switch but driving LEDs instead of LCDs to enable reading under low light conditions.

A power on-off switch

The computers I have seen seem to be manufactured by the Yang Chow company. They are powered by two replaceable AA

cells fitted internally that have a very long life. That fulfils the requirement for a simple power supply. Most have no on-off switch, presumably because the power consumption is only microamps. But both computers I experimented with had auto shutoff so a switch is only strictly necessary for those without it! But note that the auto shutoff is normally only for the display. The rest of the computer is still powered and in 'sleep mode'. It re-awakens if the wheels or belt start moving. The batteries should last for close on their shelf life when the device is used as a loco speedo, but for the longest life choose alkaline cells. Ordinary cells can also be used and probably cost less overall even though they would need earlier replacement.

If the user wishes, it is a simple matter to break into one of the leads to the battery holder and add an ultra miniature SPST toggle switch somewhere on the panel near where the computer is mounted (e.g. Dick Smith Cat. Number P7673, which costs about \$2). The power switch gives a convenient reset function for those computers without a specific reset button should a reset be required. If the device is not going to be used for a long period then it is best to switch off the power with this switch rather than rely on auto shutoff. Better still, remove the batteries so they don't leak onto the circuit board.

Mounting the computer requires a panel with a cutout 105 x 72mm with a minimum depth of 25mm. But there may be slight variations in computers from different models of treadmill so check with your own specimen. In the pony truck the computer is just gripped between the side arms. Remember that while there are many similarities between different "brands" of treadmill, there are also minor differences.

References

- Abbott, Bill; *AME* page 41, Nov/Dec 1997, #75
Cordall, Don; *Dynamometry in 7 1/4" gauge*; *ME* two parts starting 5th June 1992 p634
Heller, Ron; *Live Steam*; page 32, May/June 1999, Vol. 33/#3
Metcalf, Ken; *ME* page 91, January 1973, Vol. 139 #3457
Shellshear, Walter; *A Loco Test Stand*; Appearing in a number of parts starting p40; *AME* April 1990, Vol 3, #31.
Tompkins, David, *Measuring for Efficiency - Design for a Dynamometer Car*; *ME* page 337 Vol. 187 No.4156.

Mini Travelling Steady Rest

A travelling steady rest for small diameters and small lathes

The steady rest illustrated sits on top of the turning tool.

The brass pad is adjustable and interchangeable. The pad has 2 different size vees cut into the front face at 90° to accommodate various diameters. It is a free fit into the adjusting screw and readily changed for other sizes.

I made the tool shown for my 9" lathe. One tool post has 8mm clearance above a 3/8" tool bit so there is ample clearance for the 6mm shank of the steady. I intended to make the tool from a piece of flat 6mm MS but being out of gas to heat it I opted for a welded construction.

The steady rest can be made, as designed, from thinner material down to 1 I would think 3mm to suit smaller lathes. I can also use the above tool on my 4 1/2" lathe so I have not tried thinner material.

In use the steady can be adjusted sideways to suit the cutting tool used. There is no vertical adjustment as I try to keep my cutting edge level with the top of the tool bit shank (see below). The cutting tool shown was randomly selected for

illustrative purposes only.

Although not clearly shown the centreline of the 6mm adjusting screw is slightly above the tool cutting edge so that the 90° 'vee' is below the screw centreline. This helps to prevent the pad rotating during initial cutting if the workpiece tries to lift over the cutting edge. The vee can of course be cut or filed lower or to suit the

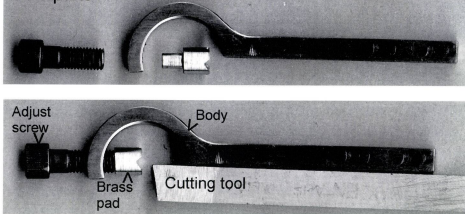
height of one's favourite cutting tool!

The adjusting screw is a hexagon socket cap screw drilled to take the pad & selected because it is already knurled.

Fully dimensioned design drawings are not offered as individual's lathes and personal preferences may vary.

— Brian Smith

The 3 parts



Making Injectors

Part 3 — Completion and Testing

by Ted Crawford

Drawings for publication by Rex Swensen

The Steam Cone

See figure 9. This has a tapered input reducing from the steam pipe to the throat which is too often shown to have zero length. Next follows the actual nozzle which is formed by a taper, expanding in size from the throat to the output which has a very thin edge where the taper meets the outside parallel turning. Achieving a thin edge and the right throat dimensions are the difficult operations.

This is the cone most likely to need replacing as it is the most prone to wear and damage due to the thin edge of the nozzle and it is the cone that is most often taken out of the body to clear dirt and so on.

It is also the one which, if modified in quite small detail, can most easily affect the injector performance. For example a variation in the nozzle outside diameter or length or a variation in the throat diameter has a strong effect on the pressure range and experiments with those could prove interesting and are easily carried out.

Required dimensions with example figures. Those with an * or in bold are most critical.

* **Throat size (T)** 63.5 thou. or 1.6mm which is 63.04 thou

* **Nozzle OD** 113 thou. This may be adjusted to suit small errors in the actual **ID** of the mixing cone. A nozzle ID of 8 thou less than the OD is assumed unless specified. This will give an edge of 4 thou. A very thin edge improves lifting action. For small sizes assume an ID 6 thou less than the OD which gives a 3 thou edge (tricky!). Some designers specify a 1.5 thou edge which is even more difficult to achieve.

Nozzle reamer angle 9 degrees. Usually +/- 1 degree is good enough for steam cone reamers.

Overall length 675 thou. Rim width 50 thou. Rim diameter 320 thou. (Less than the nut tapping drill).

* **Length from inside the rim to the end of the nozzle** is 675 - 50 = 625 thou.

* This is also called the **Length inside the body or Lib**

* **Body diameter** 250 +0, -1 thou. Or to suit the Injector body drilling used.

Nozzle length 160 thou.

Main body length (at 250 diameter) 375 thou.

Length of the external curved section between the body and nozzle diameters 90 thou (Nominal)

Tout 270 thou. Nominal (This is the depth of the throat T from

the output)

Tin 370 thou. Nominal (This is the depth of the throat T from the input)

Note that Tout + Tin add up to 640 nominal which is 35 less than Lib + Rim width. Thus 35 is the nominal throat length, approx 55% T.

Input reamer angle 9 degree finished with a flare. Angles up to 15 degrees are commonly used. Not critical.

* **Penetration or Pen.** This is the amount the steam cone nozzle enters into the mixing cone and is: (Length inside the body) - (the pressed depth of the mixing cone from the steam end). That dimension, while critical, is an assembly dimension, not actually a part of the steam cone. To keep it correct, the steam cone **Lib** must be right. In this example **Pen** = 25 thou as **Lib** = 625 and the mixing cone is 600 thou deep.

The **Pen**, with the nozzle OD and the mixing cone **ID** and angle, controls the water flow gap and therefore the pressure range.

Making a steam cone

Use brass rod a bit larger or at least equal to the rim diameter and secure it in the lathe chuck. Next follow the information given under "making a mixing cone" for facing, centring and drilling.

Drill to a depth just a bit more than the overall length of the cone to allow for the drill point to ensure full diameter for the whole length. If the drill is smaller than the exact size the throat will have to be finished to size later with a needle reamer made as already described.

Turn down to the rim diameter for the whole length of the cone plus a bit extra for parting off and truing.

Select or make a reamer for the output nozzle. Put on a limiting stop at the nozzle ID which is as specified or is the measured OD minus 8 thou (or 6 thou for small sizes). If a stop is not used, scribe a mark on the reamer where the diagonal width, which takes the reamer thickness into account, is the exact ID. A dark coloured marker pen provides a useful background for such scribing. The mark is easy to use as a shift of 12 thou on a 9 degree reamer makes only 1 thou difference to the nozzle edge thickness. A final check may be done with a gauge of 1 thou under the exact size which will be found to just catch in the hole when this is correct. If you find that you have reamed too deeply then turn a bit off the length to get it right.

The -1 thou gauge will penetrate the correctly sized cone by 1/(Tan Angle) which amounts to 6 thou for the usual 9 degrees as Tan 9 = 0.157. See the Tangent Table for other angles.

When the nozzle reaming is completed, any final throat enlarging to size with a needle reamer should be done. The enlarging need be to no more depth than twice the throat dia.

It is good practice to use a bamboo stick, such as used with barbecues, ground to a suitably angled point, to buff away any small ridges left by the reamer.

Now insert the tapered throat gauge with the final throat size marked on it as described until the throat limit is felt and mark the position on the gauge where it enters the cone. The space between the two marks will be **Tout**. In the absence of a gauge, use the reamer in a similar way. If a needle reamer or equivalent was used to enlarge the original drilling, then a separate test hole should also be made and enlarged to enable the gauge or reamer to be marked with the final throat sized hole.

Turn down to the body diameter for a length exactly as specified for the body inside length **Lib** which excludes the rim. If the actual position of the mixing cone is not exact to the design

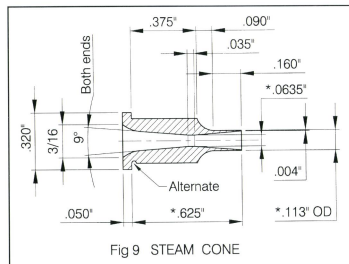


Fig 9 STEAM CONE

then the length of the steam cone can be modified to suit as it is the depth of penetration inside the mixing cone that is critical. A sharp nosed tool will be needed to form the inside corner of the rim and can, with a fine feed, be used for all the turning, finishing the external curved bits with a round nosed tool. Some workers prefer to use a small angled round nose tool set at an angle such that the inside edge of the rim is cut square. Shallow under cutting of the body at the rim is then used as this has the same effect as a sharply defined inside corner for the rim which is needed to ensure the correct penetration. **Figure 9** shows the alternatives.

As this turning to suit the body bore progresses it is a good idea to try the body for fit without disturbing the work in the chuck. The fit should be snug without force.

(Note — If the inside length of the steam cone is made say 20 thou longer, this will enable a bit of adjustment to the performance with a shim, starting with a twenty thou size. See the section on shims for how to make and use them).

Next turn the nozzle to the correct OD for the right length. This should result in a nozzle edge of 4 thou (or 3 thou for the miniature sizes). Too thin an edge may break and too thick an edge can interfere with the low pressure limit. If the edge looks too thick be very careful with any more internal reaming for correction as the metal may be stretched instead of being cut, leading to an oversized OD. That possible stretching is the reason why the nozzle inside is reamed before the outside of the nozzle is turned to size. Rather than risk stretching, it is possible to use a pointed scraper tool with a sharp edge as described under *Reamers for Small Curves* to gently reduce the edge thickness. You will need good eyes or a magnifier for this! It helps to hold a smooth bit of metal as a support behind the nozzle end to prevent spreading. Note that for good lifting action it may be necessary with some designs to have a very thin edge. As little as 1.5 thou has been specified which can only be achieved with care.

Next shape the external curved transition from the nozzle OD to the body OD. Apart from ensuring that the input waterway will be cleared this curved shaping is the least fussy operation of the lot.

Cut or part off the cone from the stock, being careful to catch it gently! Reverse it in the chuck and face off the input to obtain the rim width. The hole now visible should be at the full diameter of the through drill and should be enlarged with the throat needle reamer, if used, for at least a short length.

Put the point of the reamer for the input angle in the hole and scribe a mark on the reamer spaced from the body by the input depth **Tin** which is: *Overall cone length minus the output throat depth Tout as measured, minus the throat length needed.* This should make sure that the throat is not enlarged by reaming too deep.

Ream the input to the depth indicated; using a throat gauge to check for throat depth as you go, especially as the mark gets close to the reamed input. This process should give a throat length close to the spec. The throat length is given by the overall length minus the input and output throat depths, Tin and Tout.

Most designers specify an almost zero throat length, but experimental evidence shows there is no significant decrease in steam flow for throat lengths up to 1.25 times the throat diameter which makes life a bit easier. A nominal T/2 for the throat length is a suitable target.

A little extra reaming at the input will shorten the throat if it is too long but take care not to over do this.

Finally also polish the input end of the throat with a bamboo stick before using a hand scraper to flare the cone input to the steam pipe ID. Any smooth flare will do.

The output or delivery cone

(See **Figure 10**). This starts with a short curved entrance reducing to the throat which is usually shown as having near zero length. Following the throat is a taper expanding to the output which may be flared. Shaping the entrance for the correct throat depth and reaming for the right throat length are the most diffi-

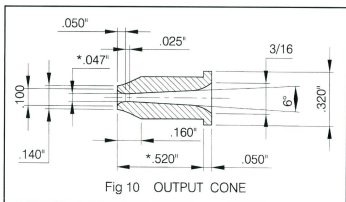


Fig 10 OUTPUT CONE

cult operations.

This cone may be lost but it is not likely to be damaged. So it is only for experimental purposes or for a new injector that it would need making.

Variations that might be tried are the throat size and length and the angle of reaming. Also the gap between it and the mixing cone output. If it has an elaborate curved entrance then a simpler variation could be tried.

Measurements needed:

* **Throat size.** Compared to the steam and mixing cone throats, it is common to find a wide variation in the diameter used for the output cone throat. Sizes of 92.5% to 75% of the mixing cone throat have all been used in published designs, with 82% being typical. Which suggests that the highest degree of accuracy for the throat size may not be justified for ordinary operating conditions. The smaller sizes have an earlier onset of dribble as the pressure falls; the larger sizes can suck in more air but have less dribble and are better for warm water.

* **Body length excluding the rim (Lib).** Normally 5 thou accuracy is adequate, but some commercially made injectors have a gap of only 12 thou or so between the output cone and the mixing cone and obviously a 5 thou tolerance is much more important than it is for a larger gap. Those details can be found out by inspection of the drawing of the complete assembly. For a new injector it is best to measure the actual distance from the body output to the end of the mixing cone and adjust Lib for the correct gap. The rule is that it is safer to make the gap larger than smaller as a gap that is too small can make starting at low pressure very difficult. A small gap is, however, better for warm water use!

* **Cone angle** to be used for reaming.

* **Details of the input curve especially the depth of the throat.**

Details of the outside curved region

Final flare details

Example dimensions.

* Throat **47** thou. or 1.2mm.

* Throat length approx 25 thou

* Body length inside the rim or Lib, **520** thou. This should give an **overflow gap of 30** thou.

* Diameter **250 +0, -1** thou or to suit the body drilling used.

Rim 50 thou wide at 320 thou diam to clear the nut internal thread.

This gives an Overall Length of 570 thou.

Input depth of throat 50 +/- 10 thou

Curved input from an inside diameter of about 100 thou down to the throat at a nominal depth of 50 thou.

Outside nose curved for about 160 thou to clear the overflow pipe.

Reaming finished with an output flare to 3/16" to match the ID of the feed pipe.

Making an output cone

Follow the instructions for the steam cone up to the point where reaming starts.

Mark the position of the throat diameter **T** on the tapered gauge using an enlarged test hole if necessary. If a tapered gauge

has not been made, then a +1 thou plug throat depth gauge should be available. There may be a sewing needle of the right size which can have the point ground off to use for this.

If there is to be a curved input then a pointed hand scraper can be used to form this, keeping close to the required throat depth or the specified throat position. This input region must be smooth with no trace of any ridging.

If an undersized drill was used, then use a needle reamer to obtain the correct throat size. As with the steam cone it is only necessary to enlarge for a length of about 2 times the throat size.

After the enlarging some more smoothing will be needed as a slight ridge will have been formed. Ridging can be removed by lightly stroking the surface in and out with the hand reamer as the work revolves.

Use the throat depth gauge, tapered or plug, to check **Tin**, the actual depth. Adjust **Tin** to spec, if necessary.

On the part assembled body, measure the distance from the body end to the output of the mixing cone and if it is not exact to the design, then modify the Lib or inside length of the output cone which is from the inside of the rim to the input end, to get the design overflow gap right, e.g. 30 thou.

On the output cone, turn the body diameter to size, trying it in the body for a snug fit as you go. The **Lib** is made to get the overflow gap within spec. Also turn the rim diameter. The inside corner of the step to the rim should be well defined as for the steam cone. Allow extra rim width for trimming and cutting off.

Shape the outside of the nose so that the overflow path is clear. A border around the curved entrance need be no more than 15 to 20 thou and there is no reason for the rest of the shape to be critical.

Polish the input to the throat as for the steam cone.

A really smooth entrance and throat will get the best out of the injector. A bit of metal polish on a pointed stick is a useful aid to attaining the best finish.

Part off, reverse it in the chuck and trim the face and rim width.

If the throat was enlarged after drilling then do the same at this end for a short length for gauging purposes.

On the reamer for the desired angle, put the point into the exposed throat sized hole and at a distance of **Tout** from the cone mark the reamer; a marker pen is useful for this. **Tout** is the distance from the throat to the output. This distance is worked out from the drawings and/or measurements and equals the overall length minus the measured **Tin** minus an allowance for throat length such as T/2.

Ream the output carefully as for the steam cone but stop to check when there is at least 50 thou or so to go. Take the cone from the chuck and use the throat gauge to check progress. Continue reaming carefully until the **T** diameter on the gauge is judged not less than $\frac{1}{2}T$ and not more than **T** thou from the input start of the throat. This is not so difficult as it sounds. It is better to have an insignificant straight section than an enlarged throat.

Finish by polishing the throat from the output end and add any final flare with a hand scraper to match the output feed pipe diameter. The shape of the flare is not at all critical and a short flare is suitable.

Shims

Shims are a useful means of adjusting the position of the steam and output cones by spacing the inside of the rim from the end of the body. They are particularly handy for the steam cone as the working range can usually be easily adjusted with a shim, adding one to raise the pressure or removing one to lower it. A skim taken from the inside of the rim is the same as removing a shim, and if overdone then a shim can be added.

A bit of "Chinese" hacksaw blade shaped and set a bit below the lathe axis makes a good parting off tool for shims that wastes a minimum of material. Start by turning down the OD of some brass rod to the cone rim OD and drill deep enough for what you think you will need with a bit that is 10 to 15 thou bigger in diameter than the cone body. Part off a nominal 10 thou, advance the top slide by the tool blade thickness plus 5 thou and part off

again. Next time increase the advance by 5 thou and continue in that way to accumulate a series of shims increasing in 5 thou steps of thickness, repeating any thickness as required. Exact thicknesses are not critical; cone penetration to within 3 thou is usually good enough for working purposes.

Rubbing a shim on a stone will deburr it and can reduce the thickness.

Measuring existing cones

External measurements are relatively easy but the problem is to find the internal profile which reveals the throat and other details needed for the reamers. A solution is to use a series of diameter gauges and note the depths of each diameter from the ends. It is good practice to repeat all the series of measurements at least once. The results are then plotted 10 or 20 times full scale and when the little bumps and irregularities due to errors are smoothed out the profiles are revealed. An assumption that an angle in whole degrees has probably been used is reasonable, at least for over 8 degrees. $\frac{1}{2}$ degree steps may be used with smaller angles.

That process is fairly simple for the removable cones, but the mixing cone is more difficult as it is deep inside the body and more care is needed. Rub the body steam input end flat on a stone to remove any small burrs before starting as this will be the reference for depth. The overflow gap is usually accessible through the top ball valve.

The best gauges to use are turned down from brass, but drill shanks can be used if they are squared off to remove any end bevelling and measured as the shank is usually undersize. Useable alternatives can be made from strips of thin metal if the edges are smoothed and only gentle force to avoid scoring the cone internals is used.

A third hand such as a clamp is an essential tool to hold the work as the gauge depths are measured.

Measuring the penetration and output overflow gap

From shim material cut a disc, a square with the corners trimmed off will do, that is an easy fit in the body bore.

Make sure it is flat and place it against the mixing cone input. Hold the body in a vice and gently hold the steam nozzle against this shim so that the gap between the rim and the body can be measured with feeler gauges. Repeat the measurements at various points around the rim for an average. Deduct the shim thickness from the measured rim to body gap and the remainder gives the penetration. For the gap between the mixing and output cones a few more layers of shim may have to be used to extend the mixing cone output end to enable a gap between the rim of the output cone and the body. The required overflow gap is the shim total minus the measured rim to body gap.

Calculating the Annular gap (For reference only)

This is the gap between the steam nozzle and the mixing cone that meters the water flow.

The outer diameter $D = Id$ of Mixing cone - Steam cone penetration x Tan A of the mixing cone.

$$D = 139 - 25 \times 0.157 = 135.1$$

$$\text{Example The gap width } W = (D - \text{Steam nozzle OD})/2$$

$$\text{Example } W = (135.1 - 113)/2 = 11.04 \text{ thou.}$$

This shows how narrow the gap is through which all the feed water is sucked.

Lathe backlash help

A nuisance on some lathes is the slack in the cross slide nut which leads to uncertainty in turned diameter. This can be avoided by hand pressure so that the slack is taken up or by tightening a gib lock screw. But for small diameters such as cones a compression spring plus a spacer if needed can be fitted on the cross slide lead screw between the fixed and moving parts. The turning tool position is arranged so that the spring is highly compressed when turning at zero diameter. Then if the spring is strong enough it will take up all the backlash at small diameters making life easier when turning to tight tolerances. Alternatively, a tension spring can be arranged to do the same job, connected

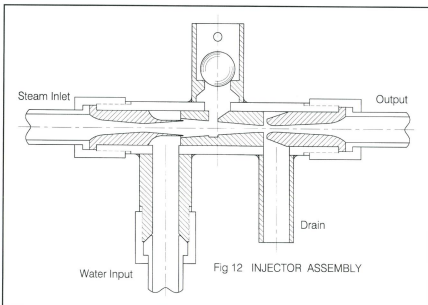
from the cross slide to some fixed object on the bench.

A body for a 60 oz per minute injector

(See Figure 11) The dimensions for a body to suit the cone example dimensions in the text are:

- Overall length * 1750 thou
- Diameter of brass stock $\frac{3}{8}$ ". Use $\frac{7}{16}$ " if more convenient but the cone rims would then be 375 thou.
- Bored 250 thou (or 6 mm, 236.4 thou, or Letter G drill, 261 thou as convenient)
- Threaded 26 tpi or $\frac{1}{8}$ " bsp ($\frac{3}{8}$ " stock only) for $\frac{1}{4}$ " at each end. The thread limit is set by the water input fitting.
- Water input hole $\frac{3}{16}$ " or 4.6 mm at 500 thou from steam end
- Turret hole the same size at 875 thou from steam end. Note that this position is biased towards the output.
- Output overflow hole the same size at 1300 thou from steam end
- Mixing cone start * 600 thou from steam end (finishes at theoretical 550 thou from output end)
- Water input fitting also from $\frac{3}{8}$ " stock, OL $\frac{3}{4}$ " to $\frac{13}{16}$ " including $\frac{3}{16}$ " for filing or milling to fit the body and drilled $\frac{3}{16}$ " or 4.6mm with the input coned at 90 degrees, to suit a coned tail for $\frac{1}{4}$ " OD pipe. The thread the same as the body but a few extra threads may be useful.

The Simple Turret as shown in Figure 2 is also made from $\frac{3}{8}$ " brass filed or milled to fit the body and drilled first with $\frac{3}{16}$ " or 4.6mm for the ball seat and $\frac{5}{16}$ " or 8mm for the ball clearance. A $\frac{1}{4}$ " ball with a wire ball retainer is used. Use an end mill for the seat surface if available and enlarge the underneath of the seat for ease of alignment to the body hole leaving $\frac{1}{16}$ " for the seat thickness. The turret height above the body is $\frac{9}{16}$ " so that the OL is $\frac{3}{4}$ ". See the turret notes and drawings for more details. If the type, shown in Figure 1, which discharges through the overflow pipe is preferred, then the turret will probably need to be made of $\frac{1}{16}$ " stock to accommodate the thread for a screwed cap and the hole for the output overflow will have to be continued through the top of the body.



The output overflow can be $\frac{1}{4}$ " OD tube let into the body for support if soft soldered.

The steam input is $\frac{1}{4}$ " OD pipe fitted with a nut and tail with flat end to seal against the steam cone and the same arrangement is used for the feed to the boiler. The three nuts can be made of $\frac{7}{16}$ " or $\frac{1}{2}$ " hex brass (for $\frac{3}{8}$ " body stock) with an internal thread with at least 4 full depth threads of the same type used on the body. As the nut depth also accommodates the rims of the cones and the tails totalling about 80 thou, the full thread does not have to reach to the end closure (which has to be about 60 thou thick and drilled to clear the tail body). The external length of the nuts should be 350 -0 +50 thou, but not too long or the thread on the body may be too short so that the nut will not tighten up properly against the rims.

Assembly and test

(See Figure 12) The drawing shows the steam cone is next to the water input with its nozzle just penetrating into the solid or one-piece mixing cone which has been pressed in from the steam end. The simple turret is shown. All the external pipes are $\frac{1}{4}$ " OD with standard tails. A coned tail is used for the water input as this gives a better seal.

This example injector should start and operate with first the water and then the steam turned full on from 110 psi down to about 75 psi. At lower pressures, the water tap will have to reduce the input for starting, and, as the pressure is reduced towards the lower limit of about 30 psi, the water reduction will need to be adjusted for operation and to get rid of any dribble. Turn the water on first.

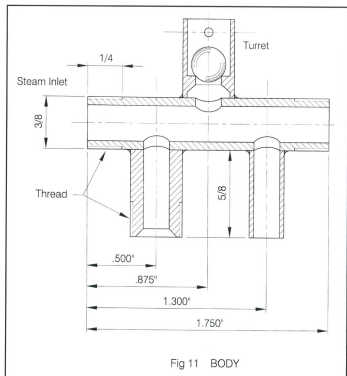
If the pressure range is not correct, this indicates an adjustment to the steam cone, for example less penetration for higher pressure and vice versa. The problem could be caused by the mixing cone input diameter or the steam cone nozzle OD being incorrect or the penetration not being 25 thou. The gap between the nozzle and the mixing cone through which the water is sucked is theoretically only 11.04 thou, so a change of 1 thou in a diameter or 6 thou in penetration is significant.

If the steam cone is secured in place with the nut and a spare tail, and a plastic tube with a funnel are put on the water input, then with the funnel in a bench vice to give 1 metre head, the flow of clean water through the injector into a measuring jug should be 600 to 650 milli-litres in 60 seconds if the gap is right.

The maximum recommended water temperature is 35°C, but a slightly higher temperature is possible below 100 psi.

Summary

It is hoped that sufficient information has been given and presented in a clear enough form to encourage a bit of experimentation for which the hacksaw reamers are ideal as they are so easy to make.



In the *Making a Cone* descriptions, a lot of emphasis was placed on the use of gauges and so on to check the work as it was progressed. This checking is an essential part, and success without it will be fortuitous.

A high speed lathe is not essential as all the authors' work on injectors is done at 800 rpm.

If you have an injector that gives every satisfaction except that perhaps it is too small or too large then if it is very carefully measured and all the critical dimensions are scaled up or down as appropriate, you should be able to make the size of injector that you need.

The steam cone throat, nozzle and

penetration, the mixing cone in all aspects, the overflow gaps and the input and throat details of the output cone are the key factors that determine performance.

It is probably best to use the nearest stock size drill for the steam cone and vary all the other proportions to suit, using needle reamers to adjust the other two throats if necessary. Preserving all the correct proportions including that of the important annular gap is essential for a first trial. The size of the ball valve will not be critical provided the seat is not smaller than the scaled size. The same applies to the steam and water pipe sizes. Remember that the feed increases as the

square of the throat sizes so that doubling the dimensions will alter the feed rate by 4 times and halving the dimensions will reduce the feed to a quarter of the original amount.

For example, for 25 oz per min instead of 60, the throat sizes and other important dimensions are multiplied by the square root of 25/60 which is 0.645.

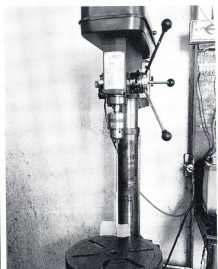
This brings us to the end of the article on Making Injectors. This series will be combined with the author's previous series on the Model Injector Explained and released shortly in book form under the title of The Model Injector. ...Ed.

Suitable Soluble Solutions

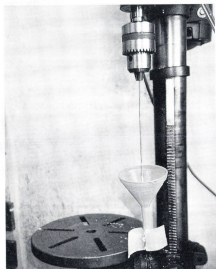
by Peter Johnson

A mess free way of mixing perfect soluble cutting oil.

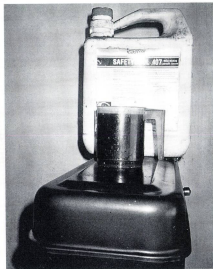
SUIT need not be changed for overalls, **SOLUBLE** oil gradually added to water, **SOLUTION** — perfect mix, no mess



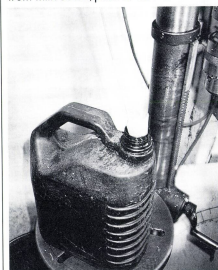
1. Take piece of coat hanger wire, bend end 40mm back on itself. Cut paddle 80 x 40 from milk bottle, place in wire U.



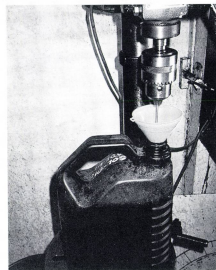
2. Squash wire in vice to secure paddle. Put small plastic funnel on wire/paddle.



3. Use plastic measure to obtain correct dilution rate according to suppliers directions (I use 250cc for a 5 litre bottle).



4. Fill bottle with water, allowing for oil dosage. Wrap paddle and push it into bottle neck.



5. Lift bottle up but with paddle clear of bottom. Raise drill table and swing underneath to support it.



6. Start drill, medium speed and add oil into funnel. That's all there is to it!

A Tasmanian Steam Safari

Story and photos by David Proctor



Former Launceston Municipal Tramways combination car no. 16 waits for passengers outside Penny Royal World.



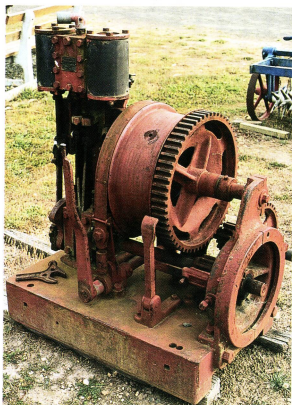
1909 vintage 8 nhp 3-speed Foden traction engine looks magnificent, under cover at Pearn's Steam World.

The Convention in Evandale was only part of the trip to Tasmania at Easter. The first non-convention site visited was the site of the former TGR Railway Workshops at Inveresk in Launceston, now part of the Queen Victoria Museum and Art Gallery. The blacksmith shop has

been preserved intact and has added sound effects to capture the atmosphere. There are many other displays in the various buildings, some of which are not railway related. The old weighbridge is still there and carries an H class loco chassis, which has been cut short just behind the coupled wheels. Also on display is a Y class diesel and some vintage rolling stock as well as a former Mount Lyell Krauss 2 ft gauge loco. The Launceston Tramway Museum is also in the railway precinct but it was locked up. Before heading back to Evandale a quick visit was made to the Penny Royal

World complex where a former Launceston tram runs along a few hundred metres of track. Unfortunately the tram is now of diesel hydraulic operation and the visual aspect is somewhat diminished as the trolley pole has been removed from the roof.

On the Tuesday morning after the Convention wound up, along with two friends, Barry and Peter, I left Evandale and headed off on a trip which would include most of the steam sites in Tasmania. When we left Evandale we headed generally west as we had decided we would travel via the West Coast and then down to the Hobart area. For our overseas readers, Tasmania is Australia's



This winch, in the grounds at Pearn's, was built by Sullivan Machinery Co, Chicago (Shop No. 2718 — no date shown)



Part of Pearn's collection of Weir pumps



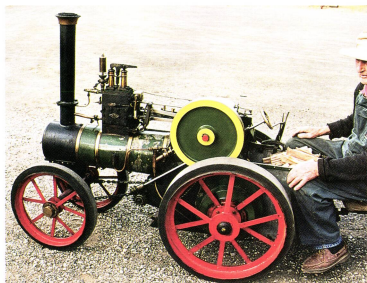
This small Yarrow boiler, built by Jim Gray, powers the steam launch on display at Pearn's.

island state and Hobart is the state capital, located on the south eastern coast.

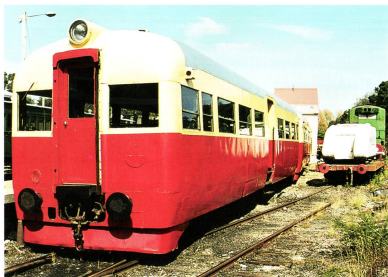
As Peter has a more than passing interest in the products of Beyer Peacock and locomotives with 'slopey cylinders' we stopped and looked at some "stuffed and mounted" locos in parks in towns on the way. Our first stop was to look at a TGR 'H' class 4-8-2, minus tender (neither BP nor slopey) in a park in Perth. My first impression was SIZE! I always thought the

TGR had a small loading gauge but for a 3'6" system it is fairly large.

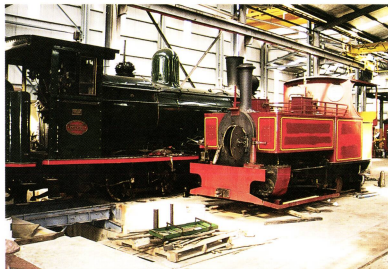
After leaving Perth we headed to Westbury for our first major stop — Pearn's Steam World. This museum has



The 6" Wallis & Stevens was popular with the tourists at Pearn's



On the day we visited, the Don River Railway were running this rail car to Coles Beach (they run steam on Sundays). Note the water tank on the flat wagon — a relic from an Australian Standard Garratt



Ex TGR CCS class No. 23 and Ida Vale Railway's 0-4-2T Hunslet are being overhauled in the Don River Railway's impressive workshop

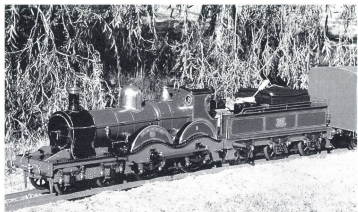
at Pearn's are stored (packed) in two very large hangar-type sheds and are very difficult to photograph. This was also the first of many places where we met up with other conventioners.

The next port of call was to be the Don River Railway at Devonport but first we had to check out Beyer Peacock built TGR 4-6-0 E1 in a park in Deloraine. This 1907 vintage locomotive is in fairly good condition given its age and current location. At the Don River Railway we took the railcar ride to Coles Beach and back before inspecting the workshops. With its large, modern workshops this railway would have to be the best set up of any preservation group I have seen. After leaving the Don River it was a short drive to the NWMES track at Ulverstone where an informal post-Convention run was in progress. We stayed for a couple of hours before moving on to Burnie for an overnight stay.

The next morning we pointed the car south, running alongside the former Emu Bay Railway towards the west coast and



H7 (4-8-2) and M3 (4-6-2) sit staring at the Don River Railway turntable



John Hagan took his lovely old GWR Dean Armstrong class 4-4-0 Gooch to Ulverstone and son Bruce kept the driver's seat warm



Some of the very friendly NWMES members and club loco. Thanks chaps!

Queenstown. En route we called in at a museum at Waratah, the site of the Mt. Bischoff tin mines, now long since gone, and then to Tullah, the home of the 2 ft gauge Wee Georgie Wood. The previous Sunday was the last run for the season so we had to be content to look at the Fowler loco and rolling stock through a steel mesh barrier.

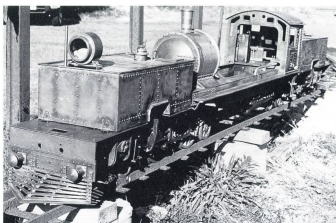
There was lots to see at the Pioneers Settlers Museum in Zeehan. Outside there are several locos on display, mainly ex

TGR plus a mining Krauss. Inside is an enormous amount of material relating to the settlements, shipping, mines and mining railways on the West Coast. In the main entrance is a very nice 3 1/2" gauge model of the Hagans Patent Dundas Tramway J class, built several years ago by Geoff Murdoch.

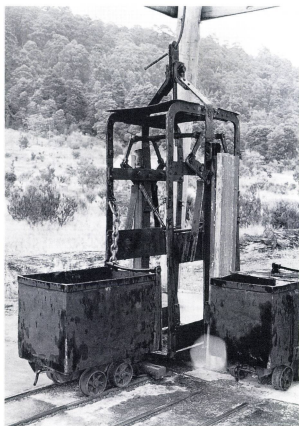
From Zeehan we went to



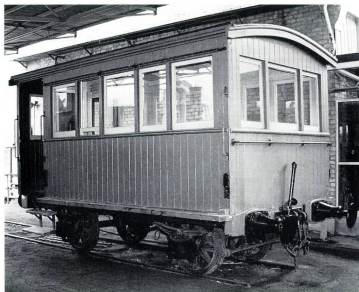
An early South Australian at NWMES, Ulverstone — the loco, that is, not owner/driver Bob Smith



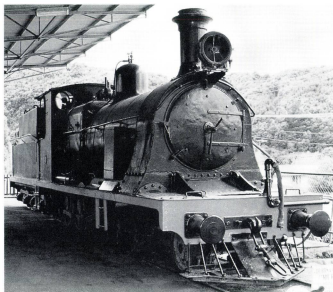
Graham Loan's M class 4-4-2+2-4-4 Garratt is taking shape



This interesting display was just across the road from Wee Georgie Wood. The gauge looked to be about 15 inches.



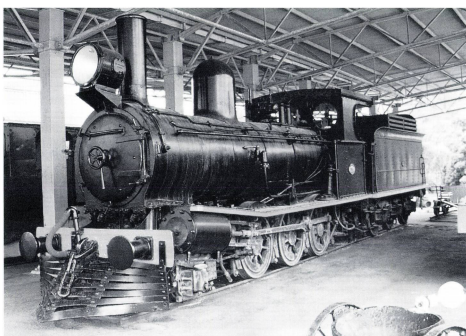
This small 4-wheel carriage is at the museum in Zeehan



Ex Emu Bay Railway locomotive Murchison (Dubs & Co, 1900)

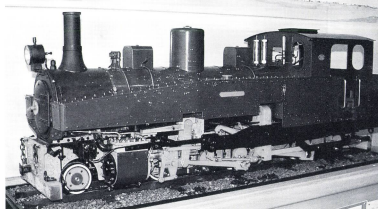
Strahan to have a look at that end of the Abt Wilderness Railway. Two carriages were standing in front of the beautifully restored Regatta Point Station. From here it was a slow drive over the mountains to Queenstown where the hillsides are slowly re-vegetating after having been totally denuded by excessive gathering of firewood and sulphurous fumes emitted by the local smelter during the heyday of mining. All of the towns on the west coast are there as a result of mining activities, the area once being very rich in gold, silver, copper, zinc and many more minerals. On arrival in Queenstown we went straight to the station to check out the Abt Wilderness Railway and to get tickets for travel the next morning.

The Abt Wilderness Railway is the name of the railway which operates on the old rack railway formation between Queenstown and Strahan. They have two fully restored Abt locos, built by Dubs & Co, in steam and quite a fleet of purpose-built passenger carriages which resemble the original rolling stock of several decades ago. At the moment the trains operate from Queenstown to Rinadeena at the summit of the rack climb from the east and from Strahan to Dubbil Barril at the

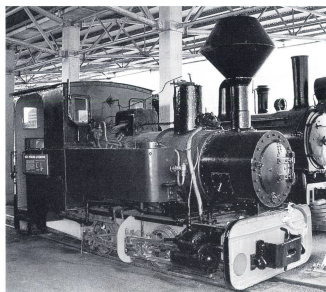


Also at the Zeehan museum 1884 vintage ex TGR 2-6-0 Class no. 1 built by Beyer Peacock

of the rack on the western side. Work is almost complete on the



The model of NE Dundas J class Hagans patent loco built by Geoff Murdoch. Some reflections from the glass case are evident.



2 foot gauge Mt Lyell No. 8 (Krauss 5480/1906)



The refurnished Strahan station and two of the Abt Wilderness Railway's carriages

western rack ascent from Dubbil Barril to Rinadeena, whereupon the trains will operate the full length of the line (should

be operating by the time you read this article). The trip on the rack railway was the highlight of the trip to Tasmania as far as I

am concerned. The run from Queenstown station was generally down hill for a few kilometres before we started a gradual ascent to Halls Creek. After Halls Creek the track rapidly gets steeper until the gradient is about 1 in 16 and the rack centre rail starts. The train slows right down as the driver visually checks the rack engine and rotation of the toothed wheels under the loco to ensure they mesh 'gently' into the teeth of the centre rail. It is then a steady, slow slug up the hill, 1 in 16 all the way to the summit at Rinadeena Station. There is a short passing loop at the station and the rack climbing from the western side does not reach its summit until about a quarter of the way along the Rinadeena platform.

After the trip back down the hill to Queenstown, and a quick lunch we headed for Hobart, stopping at the Derwent



Mt Lyell No.1 outside the loco shed is almost ready for a day's work



A train hauled by No.3 departs Queenstown station



No.1 is about to back into the station to collect its train



The gear under the loco which engages the Abt rack

Valley Railway at New Norfolk on the way. Not much to see here as all three of their steam locos were dismantled and spread around a paddock. It appears that they are currently running their mainline excursions with a couple of old diesels.

The next morning we went out to Port Arthur and the 15" gauge Bush Mill Railway. I was pleased to see that the engine in steam was the model of the first Garratt, K1. This is a beautiful loco and certainly can haul a large load up the very steep grades to be found on the railway. The ride starts at the top of the hill at the Bush Mill and winds down a long descent which includes a very high curved viaduct, finishing at the Fox & Hound Hotel, several metres lower down. Actually the whole complex is on the market, so if you want a larger garden railway than your friends...

On returning to Hobart the next stop was the Tasmanian Transport Museum. It was not open, being a Friday, but the gate was ajar and some people were working inside. We were made most welcome as

Excitement on the Rack

After attending the Evandale Convention a group of us headed to Queenstown for a long awaited trip on the Abt Wilderness Railway. Queenstown gave us a very wet welcome and we boarded the 1st class carriage at the front of the train so as to have the end platform next to the engine. We arrived at Lynchford and a 10 minute walk in the rain to the 1883 goldmine was well worth the effort. The journey then continued past Halls Creek and onto the rack section. About a kilometre up the rack we experienced stomach shattering shudders and jerks bringing the train to a definite halt.

The problem was that the engine (No.3) had broken the return crank which released the small eccentric (in the rain forest and the rain). What excitement!

The engine was left on the rack for later recovery and our carriages were taken back to Queenstown. Passengers were given the choice of having half the cost of the tickets refunded or riding on another train. This was a memorable but exciting adventure.

— Claire and Allan Douglas



Above and below: The 15" gauge model of K1 at the Bush Mill Railway.



A proper Launceston combination tram car, No 13 at the Tasmanian Transport Museum in Hobart.

they showed us all over the place and we saw a lot that the public who come in on weekends would never see. As well as a sizeable collection of ex TGR steamers and one diesel, they have trams and trolley buses and all sorts of memorabilia.

A visit to the Hobart Live Steamers track the following afternoon was a good way to finish an enjoyable trip. The club has two tracks, both elevated. The original track is now enclosed by a new dual gauge track for 3 1/2" / 5" gauges and the supports and beams are all made from rolled steel channel sections. The rails are pressed into wooden sleepers and it gives a very comfortable ride.

There are many other sites in Tassie worth visiting but unfortunately there was not enough time this trip. I will definitely be back.

Frank Curry

A Dual Gauge Diesel Locomotive

by Jock Miller

Drawings and photos by the author unless otherwise credited

Two years ago the Canterbury Society of Model and Experimental Engineers Inc. (CSMEE) in Christchurch, New Zealand decided that a new "diesel" locomotive would be desirable for club running, especially as a 7 $\frac{1}{4}$ " ground level track (GLT) was under consideration.

Two features of this locomotive, which may not have been used before, might appeal to AME readers, namely:

- Multiple gauge capability and
- Reversible belt drive.

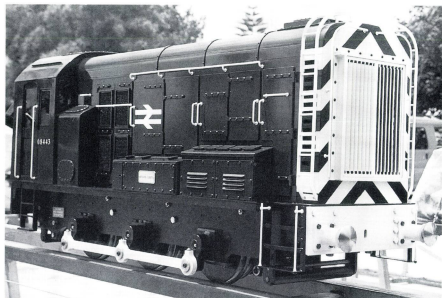
Prototype

The prototype chosen was an 0-6-0 BR 08 class English Electric diesel electric. The locomotive on which the exterior detail design was based is located at the Boness & Kinnel Railway at Boness on the Firth of Forth near Edinburgh, Scotland. Approximate scale is eighth full size with overall length of the model being 1140 mm.

Multiple gauge

As the CSMEE has a well used 2 $\frac{1}{2}$ ", 3 $\frac{1}{2}$ " and 5" raised track a locomotive that would run on both the raised track and the proposed GLT was required. To achieve this the loco wheels were constructed from 150mm dia. x 50mm thick steel billets turned to produce dual treads on each, (See Drawing and photographs).

The diameter of the flanges of the 5" gauge wheels are just a few millimetres less than the treads of the 7 $\frac{1}{4}$ " gauge wheels. In operation on 7 $\frac{1}{4}$ " gauge the 5" wheels do not conflict with any 7 $\frac{1}{4}$ " rail components such as check rails, rail frogs etc. On the raised 5" gauge track a check was made to ensure no conflict between "fish-plate" bolt heads and the 7 $\frac{1}{4}$ " wheel flanges that straddle the 5" rails.



The Frank Curry on 7 $\frac{1}{4}$ " g. at the Palmerston North convention

Photo: Dick Langford

Reversible belt drive

When considering the drive transmission from a standard unmodified 3.5 HP Briggs & Stratton petrol engine, simplicity was essential to ensure minimum maintenance and ease of construction and operation. Some years ago the writer saw at an engineering exhibition in London, a "gearbox" with belt pulleys with shrouds and belt tensioners for each belt to select a particular speed ratio. This principle was adapted in the successful Myford ML7 "Tri Leva" lathe headstock drive. As reverse was required this idea has been used for the drive from a special reverse gearbox.

The locomotive drive train is:-

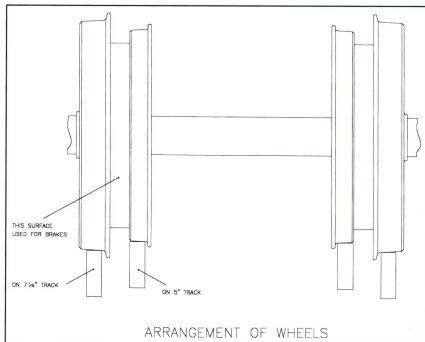
1. Standard Briggs & Stratton Centrifugal clutch.
2. "Polyvec" belt drive (reduction)
3. Purpose made oil filled gearbox with 1:1 12 DP gears to provide reverse.
4. Two "V" belt (A section) drives to the final chain drive layshaft (reduction)

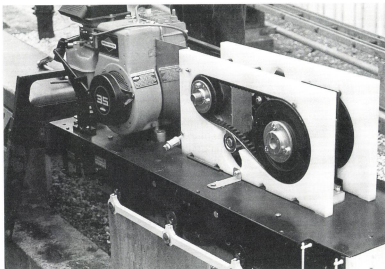
These two belt drives are normally slack and enclosed by a "shroud" of polyethylene approximately 3mm bigger than the outside diameters of the belt pulleys. (The internal circumference of the "shroud" is slightly longer than the outside circumference of the "V" belt). Two rollers tension the forward or reverse belt as required. The operating lever with adjustable detents is located on the LH side of the cab, looking forward.

5. The final drive (reduction) is by triplex $\frac{3}{8}$ " pitch roller chain to the front axle with conventional coupling rods to the other two axles.

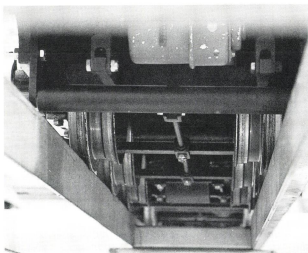
General

To date trials have been successful, i.e. the first load was 12 overweight geriatrics on 4 trolleys on the raised track. A small benefit is a slightly slower maximum speed on the raised 5" g. track because of the smaller inner "wheels". Operational experi-

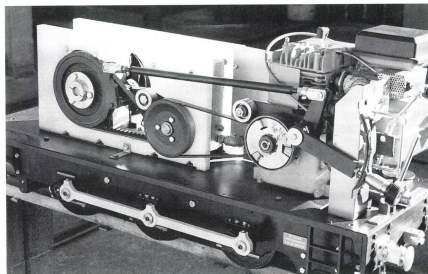




Reverse "gear" in neutral (belt clear of pulleys within shroud)



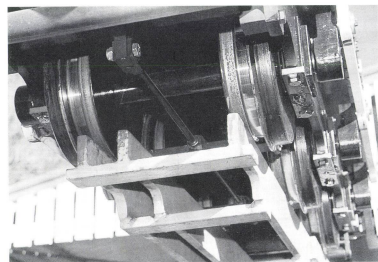
View from underneath with the loco on 7 1/4" g. track. The 5" g. wheels can be clearly seen Photo: Dick Langford



General view without cover. Forward "gear" engaged (roller tightens belt)

ence will dictate the best method of operation.

Engine throttle speed control will engage the centrifugal clutch after pre-selecting forward or reverse. In an emergency the reverse lever could be operated as a clutch or brake before the detents engage. We have used commercial "Taper lock" "V" belt pulleys so if belt replacement is required it will be easy and not particularly expensive.



In this view the loco is sitting on in 5" gauge track

Construction

Components were manufactured where possible by CAD/CAM methods. One other machine is currently under construction and CAD "As built" are now being prepared. The frames are laser cut from 10 mm MS plate, cast iron oil lubricated axle boxes are fitted, M6 HT hex bolts for mechanical fittings and the bonnet/cab has been formed from 1.6mm zintec sheet. PVC sheet has been used extensively for many of the external details such as covers, doors, louvres, etc.

Mechanical design and construction was by the writer. Ross Fielden produced most of the CAD/CAM components as well as constructing and finishing the bonnet/cab. Alan Orwin produced CAD drawings and other club members assisted with components.

On the 19th August, 2001 Mr Pat Curry formally commissioned the locomotive named *Frank Curry* in honour of his brother, a former CSME President, now deceased.

This design is offered as another solution to the problem of getting a high speed power source (3000 rpm plus) to operate on a 1/8 full size model locomotive at an acceptable speed on raised 5", raised 7 1/4" and ground level 7 1/4" tracks.

Postscript: after some months in service the drive belts appeared as the type used were not designed to bend (flex) in both directions. They didn't like being bent backwards by the tension pulley. New belts have been fitted that are designed to bend both ways and there have been no further problems.

J. O. Miller B.E. (Mech) is a long-standing member of CSME



First run — the author takes Pat Curry and family for a ride

Steam Chest



with Dave Harper

Hi there, steam fans and welcome to more enthalpic emissions from the steam chest. There's a real mixed bag this time, with the usual responses from readers, which is great, and even some photos that I've taken of interesting models that have turned up near home.

Hathorn-Davey differential delights

Firstly, I've sent out a couple of sets of the information on the Hathorn-Davey differential engines at Charters Towers that were featured last issue. One went to Bill Rutiser, of Maryland in the USA, who hopes to build a model of them — that I would like to see! The other copy went to now regular correspondent Jim Libbey, who has said he'll try and figure out how the differential engines work, and if he succeeds, will write an article for *AME* on the subject. I wish you well, Jim, we'd all like to see that!

More on the Hargraves rotary revolution

The rotary engine of Lawrence Hargrave also bought a couple of responses, from Ian Griffiths and John Single. Both of these gentlemen sent me copies from the biography of Hargraves by Shaw and Ruhen, with the original drawings by Hargraves, and a photo of a replica built in

the workshops of The Museum of Arts and Sciences, Sydney. (Figures 1 - 3)

The accompanying text gives the following information: the cylinders are .88 inches in diameter, the stroke is 1.3 inches and the valve cuts off at 75% stroke. The screw blades are set at an angle of 20 deg giving a pitch of 44.4 inches. The diameter of the screw is 36 1/4 inches and the area of each blade is 32.7 square inches. The prop turns at 456 rpm and the receiver pressure started at 150psi.

The air receivers for these motors are made of ordinary tinsmith's tinned iron plate of .013 inches thickness. It is found to have a breaking strength of 62,000 lbs per square inch section. 3 inches was the diameter determined on, and .18 cubic feet capacity. The weight is 29 ounces and it has been pressed to 250 psi without any signs of weakness. The longitudinal seams are 5/16" lap soft solder joints which proved more than strong enough. The folded joint, though easier to

make, is obviously weaker.

Bearing in mind the age of these comments, I'd have to follow with the usual instruction — don't try this at home!

The photos of Hugh Carter's 1930s models of this type of engine (P18, issue no 102) show that the 3 inch dia air receiver was retained, but the engines are of the fixed, radial type rather than the rotary engines as built by Hargrave. The air tank material also appeared to be shim brass rather than tinplate.

Thank you Ian and John for providing this fascinating glimpse of one of aviation's lesser-known pioneers.

Little Husky mods from the West

Ian John, who hails from faraway Tom Price in WA, also sent me some photos of the model engines he has made.

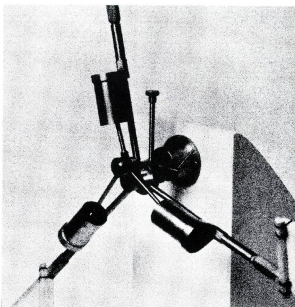


Figure 2 — A full size reproduction of the engine made in the workshop of the Museum of Applied Arts & Sciences, Sydney (now Powerhouse Museum)

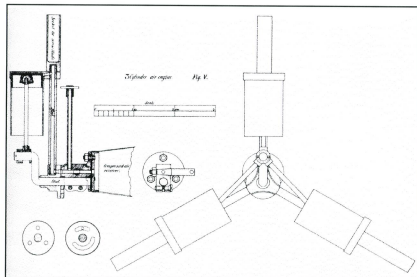


Figure 1 — Hargrave's line drawing of his 3-cylinder radial rotary compressed air engine, showing the cylinders on the roots of the propeller arms and a sectional view of one of the cylinders.

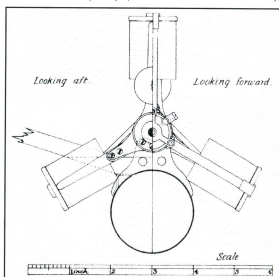


Figure 3 — Hargrave's line drawing made to illustrate his Royal Society paper describing his 3-cylinder radial compressed air engine no. 13

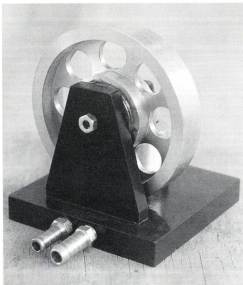


Photo 1

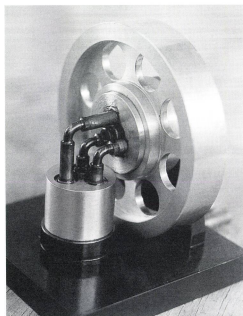


Photo 2

Unfortunately neither were sharp enough for reproduction, but thanks for the effort, anyway, Ian. The models shown were of a little vertical engine by Miniature Steam, a horizontal oscillator from an American web site, and the *Little Husky* from plans that I sent him.

Ian made a few changes to the *Husky*, including silver soldering the cylinder/valve to the base, and using only four columns. It still works though!

Ian's most telling comment was that seeing his eleven year old nephew's eyes light up when he saw it running made it all worth while. As he says, if anything without computer graphics can hold the attention of a modern child, it has to be a steam engine.

Next project is the elbow engine — then the models from Tubal Cain's books. Sounds like you're enjoying the lathe and bench work as a hobby, even after working at it for a living for many years — as you say, it takes a while to get the proper mind set, but worth the effort! Thanks for the input, Ian.

Speaking of the Elbow Engine

I had a welcome visit from my new friend David Dettmar a while ago, and he brought along his newly finished model elbow engine. Apparently David started this model many years ago, but somehow misplaced the drawings. It was only after I supplied him with another copy of the drawings that he was able to complete the model. David commented that absolute accuracy in

the elbow bends was essential to get it to work, and he used bronze for the cylinder sections. The model looks very neat, and works well on a few psi of air pressure. **Photos 1 and 2** show David's model.

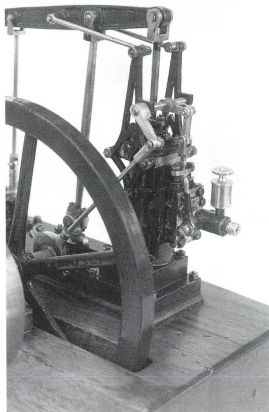


Photo 4

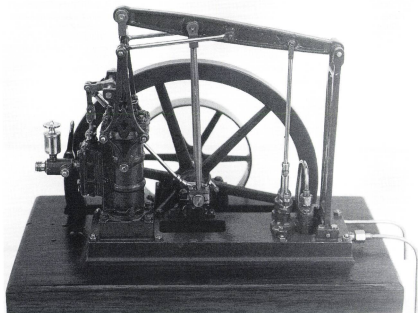


Photo 3

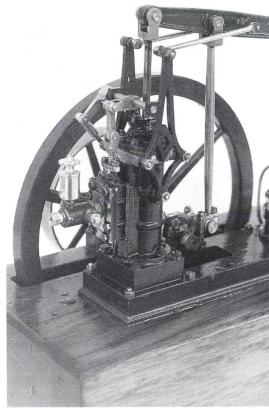


Photo 5

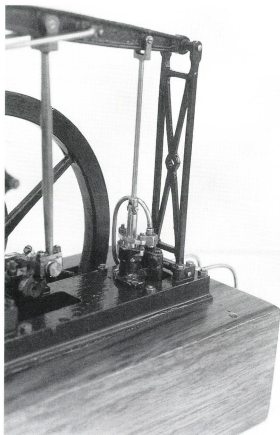


Photo 6

Dave Sampson's latest

Our master miniature model maker at the Boiler House Steam & Engine Museum at Petrie, Dave Sampson recently unveiled his latest effort. It is a grasshopper beam engine made to Dave's usual high standards, and tiny scale. The bore of the cylinder is $\frac{3}{8}$ " and the stroke is about 1". This makes the half-beam only about 4" long, and the whole model is a delightful example of Dave's impeccable handiwork. **Photo 3** is a general view of the model complete on its wooden base. It is all fabricated, no castings for Dave!

Photos 4 and 5 are of the cylinder and valve assembly. Note the valve driven from the eccentric via a layshaft, and the ornate supports for the parallel linkage for the beam. The tiny lubricator works, and is necessary as we normally run the models on compressed air at the Boiler House. **Photo 6** shows the feed pump driven by its own rod from the beam. I wasn't game to ask what bore and stroke it is, but it works! The

rocking arm support for the half beam is also shown well in this shot — it is all soldered up from individual pieces ... good one, Dave.

Dave's collection of models can be seen working on our steaming days, the first and third Sunday of each month.

More old steam toys

I have some reservations about including steam toys in this column, but they seem to keep turning up, so I guess I'll go along with it. I was hailed by Warren Starr recently when I dropped by the Bracken Ridge Central track. Warren told me he had a couple of dribblers in his van, and could I please photograph them for him, to try to get more information on them via *AME* readers? How could I refuse?

Just about then, the heavens opened and it started pouring with rain, so these pictures were shot in the shelter of the awning at the track in less than ideal light. Thank heavens for modern fast films! (Kodak Max 400 ASA)

The two dribblers were similar, yet quite different in the drive arrangements — one having the cylinders in front of the wheels and the other, behind.

Photos 7 to 10 show the side and bottom views of the two models. There are enough similarities to suggest that they both are from the same manufacturer,

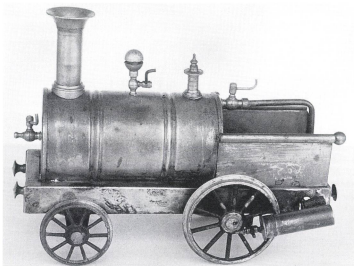


Photo 7

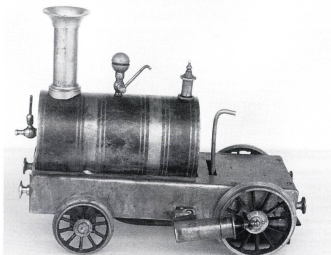


Photo 9

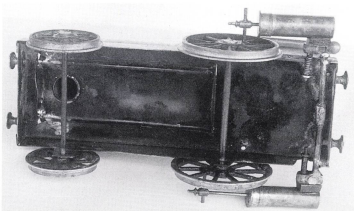


Photo 8

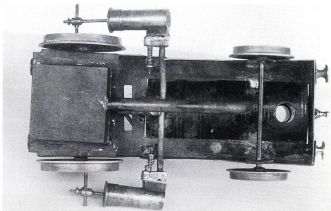


Photo 10

maybe one of our readers with a copy of the book on steam toys can help us out? As Warren apparently bought the models at a sale from a deceased estate, we have no idea of their provenance.

The toy steam launch in Hugh Carter's collection (photo 5, p19, issue 102) caught Allan Wallace's eye as he has a similar model passed down to him by his father. Allan wrote as follows:

I had to make a support for the front end of the boiler. I always wondered what was there originally. It is fired with methylated spirits. The original tinplate burner rusted out, and I have replaced that too. One of my very first turning jobs as a kid was to fit the little brass bollard to the bow. The boat lacks any lubrication system, which is common for small wet-steam oscillators, of course, but I believe it would benefit from a small displacement lubricator. I have replaced the piston several times, and the bore is oval.

Dad said his father bought it for him for Christmas in about 1930, from 'Foy and Gibson Pty Ltd', a shop in Adelaide on the corner of Pulteney St. and Rundle St. (That site is now a multi-storey car park complete with McDonald's!) The steam boat was called *Miss Liberty* and we still call her by that name. Dad thinks it was made in Japan, and it came with a paper American flag (stars and stripes) on a short flagpole on the bow.

The paint is almost gone now, but it was blue above the waterline and red below.'

Thanks very much for the information and photos Allan. This is obviously a well loved and much used family heirloom. **Photo 11** shows Allan's little launch.

Some history from Hobart

Another local friend, Clinton Taylor, kindly loaned me **photo 12**, which shows a very interesting little beam engine which is on display outside the Hobart Institute of TAFE. The plaque on the engine reads:

'World's Oldest McNaught Beam Engine'

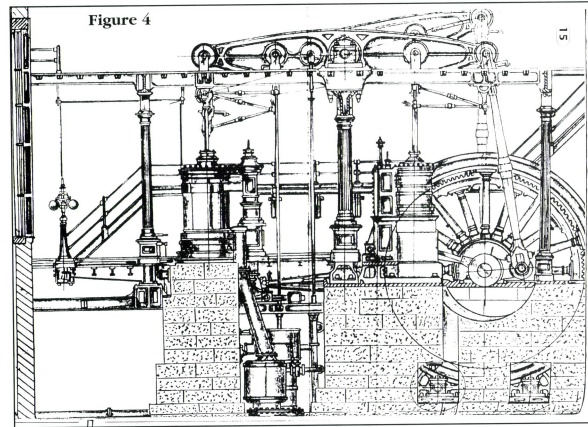


Figure 4

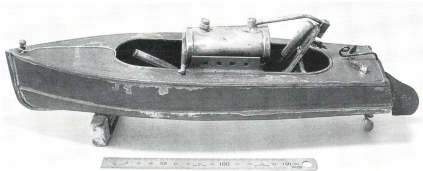


Photo 11

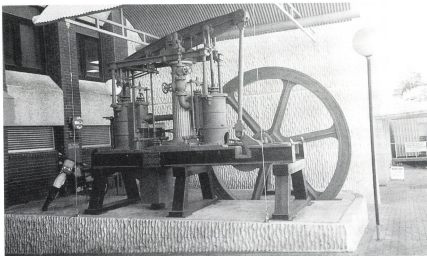


Photo 12

This compound expansion steam engine incorporated high and low pressure cylinders placed on opposite sides of the central column in accordance with the 1854 patent of William McNaught. It was manufactured in 1854 by A & W Smith of Paisley, Scotland and probably imported by prominent local engineer Henry Clark.

After 100 years of service the engine was removed in 1955 from Risby's sawmill in Collins St, Hobart and placed here in 1990.'

That certainly makes this a very historically significant engine. It is also a style that I've never seen modelled. Maybe one of our readers in Tasmania could run a rule over the engine and work up some drawings for us?

Certainly, many early beam engines were 'McNaughted' to extend their working life, by enabling them to use higher boiler pressures.

Digging into my copy of George Watkins' book *The Textile Mill Engine* (still available via

Plough Books) there are three beam engines shown as having been built as singles, then later 'McNaughted', as well as three more that were originally built as McNaught compounds.

My comment that the Hobart is 'little' is borne out by one entry, for I & I Craven Ltd., Dalton Mills, Keighly.

"When these woollen mills were built in the 1860s it was decided to provide the power from a single unit, and this gave us the largest mill beam engine of which record remains. It was of 500 nominal hp; and designed by Wm Pickup, was built by Wm Bracewell of Burnley, cost 12,000 pounds, and took seven years to build. Developing over 2,000 hp, it was a slide valve double McNaught with high pressure cylinders 45in bore by 4ft 9in stroke, and low pressures of 60ins by 9ft., ran at 22.5rpm, and used steam at 60psi. The four cylinders weighed 100 tons, the overhead sway beams, 37ft 6in end centres by 4ft deep, weighed 24 tons

each, and the flywheel and gear driving ring weighed over 100 tons. The drive was by two underground shafts, and it was the failure of one of these in 1904 which, by allowing the pinion to roll under the gear ring, completely wrecked the engines, which were replaced by two horizontals with rope drives. The two engine-

men miraculously escaped with little hurt."

That must have been one almighty wreck! **Figure 4** is copied from the Watkins book, and illustrates these mighty engines. I can highly recommend this book to anyone with an interest in the history of mill engines.

It is sad to note that the Queensland Museum also have a beautiful little twin cylinder beam engine which is currently stored away, in pieces, in their warehouse. Offers to have it relocated to The Boiler House were rejected, but there seems to be little hope of it being put on public view again the foreseeable future.

On a happier note, I found among my files an excellent engraving of a compound beam engine — **Figures 5 and 6**. The scale on the drawing shows the flywheel to have been about 20ft diameter, pretty much a medium size engine by then current standards!

This engraving is one of the 40 A3 sheets that I copied from a priceless bound volume of *The Engineer* magazine for the first half of 1867. This volume has a heap of engravings of machinery that was in the great Paris Exposition of that year, which is probably why the book survived ... it's certainly one of my prized possessions. I've passed on numerous sets of these drawings to interested readers, and am happy to send out more at a mere \$10 a set including postage. End of commercial, and end of the column for now — until next time, happy steaming!

Remember Dave's email address is:
sandave@bytesite.com.au

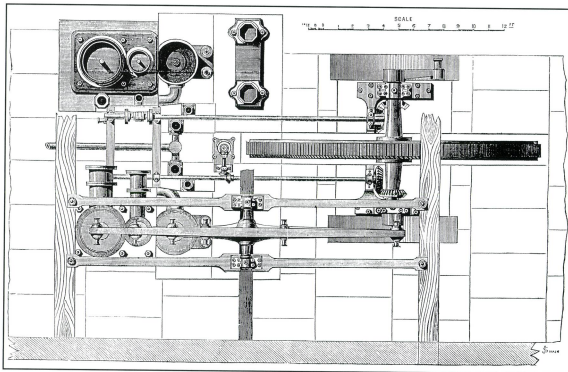


Figure 6

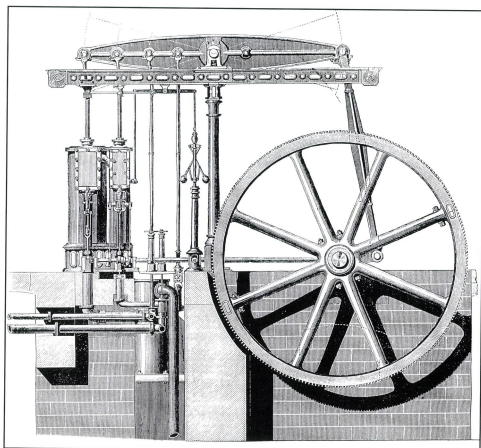


Figure 5

Fabricated Vacuum Brake Cylinders

by Barry Gerdes

Drawing for publication by the author

When operating multiple carriage train sets for passenger carrying it is necessary to have some form of braking system which can be controlled from a single point. It is also desirable to have a continuous or fail-safe system which will operate in an emergency either automatically in the event of coupling failure or manually by a guard at the rear of the train. The simplest and most common method of implementing this is by a vacuum controlled system, the vacuum generated by an ejector in steam engines, the manifold vacuum of internal combustion engines or by an electric vacuum pump in battery powered locomotives.

In this article it is not intended to get involved with the merits of simple vacuum brakes verses a continuous system or the reliability of the electric pumps made from car tyre pumps. It is to suggest a practical way to make double acting vacuum or air pressure cylinders from parts readily available from the local hardware store and steel merchant using the minimum of machining. The double acting cylinders to be described can be used in all systems either on vacuum or air pressure up to 30 psi or so.

Two variations can be made to the design. The first cylinder is intended to operate the mechanical linkage found in carriages with manually operated brakes which have some form of equalization. It has a useful stroke of 20mm and will pull or push 32 lb (14.5 kg) using the vacuum created by an electric vacuum pump made from a car tyre pump as in *AME's* 422 class loco. This stroke and pull used on fully equalized brakes can, using levers, produce a practical brake shoe movement of 1mm per axle on a four axle (2 bogie) carriage. This equates to a total braking force of around 640 lb (290 kg), enough to lock the wheels on a fully loaded carriage if used to its full power.

The second cylinder is a twin cylinder of much smaller diameter to fit under a carriage that does not already have a mechanical system but does have a pair of the commonly available lever operated brake bogies. It has a useful stroke of 20mm each end, is self-equalizing and has a pull of 26 lb (11.8 kg) each end under the same conditions as the first cylinder. The extra stroke available by having two pull rods can be converted to a braking force at 1mm per axle shoe movement of 1040 lb (472 kg) total. A note of warning here! The strength of these cylinders is enough to bend operating linkage if it is too light, and break cast aluminium levers. I have replaced all my cast aluminium levers with steel ones.

Construction of cylinder components

I used a mixture of imperial and metric components and tools and the sizes quoted are what was actually done. All sizes can be changed as required to the nearest metric or imperial to suit the available material.

The end plates are all similar and are cut from off cuts of mild steel 80mm by 6mm bar stock obtained from the scrap bin at the local steel fabricator. The rubber sheet is salvaged from old truck or car inner tubes obtained without cost from a tyre dealer who is usually only too happy to oblige. The 16g sheet metal for the large washers is cut from steel salvaged or purchased from a sheet metal shop. The rest of the parts come from the hardware store. The principle tools used were a hand saw to cut the pipe, steel bar and blanks for the washers, a drill press and a small lathe.

The first job is to cut off suitable sections of water pipe to be clamped in the lathe, trued up and finished to the sizes shown in the respective drawings. Make sure that the end surfaces are smooth and free of sharp edges that could cut into the rubber diaphragm. Each cylinder section has a hole drilled as shown and a short section of copper tube soft soldered into it using a heavy duty soldering iron or carefully applied flame.

After cutting off the end plates and deburring them a $\frac{1}{4}$ " hole was drilled in the centre. The plate was then bolted to a simple mandrel made from a piece of 1" round bar and a $\frac{1}{4}$ " bolt and clamped in the lathe three-jaw chuck. A 1.5mm step was turned down on one side to make a neat fit to the inner diameter of the cylinder section. At the same time the turning tool was used to make a shallow score on the turned surface of one end plate marking the radius for the clamping bolts. This end plate was carefully marked out and drilled with $\frac{15}{64}$ " holes to be later tapped for $\frac{1}{4}$ " Whitworth bolts. The plate was used as a template to drill pilot holes in all the other end plates. The ends used for the clamping bolt heads were opened out to $\frac{1}{4}$ "W clearance and the others tapped $\frac{1}{4}$ "W.

End plates can be of two types: with glands or sealed guides. If a gland is required the centre hole is opened out to $\frac{3}{8}$ " and tapped $\frac{1}{8}$ " BSP using a guide to ensure that it is perfectly perpendicular to the plate. The hole is tapped deep enough to give a deep penetration of the of the union. The union is then screwed home to give an airtight seal. The plate is then put back onto the lathe, held by the

hexagonal part of the union, making sure that it runs true and the union bored out to $\frac{1}{4}$ " clearance and any excess protrusion into the cylinder area faced off. The ferrule from the union can be discarded but a small washer will be required to retain the O-rings. This is made from a $\frac{1}{4}$ " flat washer, the outside turned or filed down until it will fit inside the ferrule nut.

If the end is of the sealed type, the hole in the end plate is drilled out to $\frac{1}{2}$ ". A piece of 15mm rod is turned to the outside dimensions shown and either welded or silver soldered to the end plate. The end plate is then clamped in the lathe by this rod, ensuring again that it runs true and the centre hole drilled to the required depth.

Construction of diaphragm

The diaphragm consists of four parts, the washers, the diaphragm boss, the shaft and the diaphragm itself. The washers were made first. A piece of 16g steel was scribed with as many circles as the required number of washers making the diameter as large as required to give a finished washer nominally about 10mm less than the inner diameter of your cylinders. A $\frac{1}{4}$ " hole was drilled in the centre of each circle and then they were roughly cut out with the band saw. After de-burring they were all clamped on the previously made mandrel and turned to the required size. Each washer was then finished with a file to round the edges and remove all burrs and the centre hole opened out to the diameter of the boss.

The boss is made from a 10 or 12mm set screw and nut. The screw has its head turned down till it is around 2.5mm thick and then drilled up the centre $\frac{1}{4}$ ". The nut is split down the centre and/or turned to a similar thickness. The shaft is made from a $\frac{1}{4}$ "W bolt with the head turned off. The boss is then silver soldered to the shaft at the required position, taking care not to let the solder run on the thread. Note: the 10mm screw is only used on the twin cylinder and has a $\frac{3}{16}$ " hole instead of the $\frac{1}{4}$ " hole and the shaft is turned to fit at the end.

The diaphragm is cut from a piece of inner tube and is approximately 10mm larger in diameter than the outside diameter of the water pipe used. A hole 9mm in diameter is punched in the centre using a punch made from a piece of brass or steel tubing. I used a punch made from the remains of an old car radio aerial. Keep the piece punched out to make the O-rings. The diaphragm can be fitted to its shaft between the washers and the nut tightened up. Note the 9mm hole works OK on both 10 and 12mm bosses.

Assembly of parts

Assemble all the pieces together and push the shaft in as far as it will go to pre-tension the diaphragm then lightly tighten the four clamping bolts. Pull the brake rod in and out to ensure that it does not bind and will that the rubber is not in tension. If it does not move freely you may need to polish the shaft with emery cloth till it does. If all is well disassemble the cylinder and make a gasket between the end plate and cylinder body using silicon rubber sealant. Reassemble the parts again as before, do not forget to pretension the diaphragm, and tighten the clamp bolts to about 5 ft lb. Check that the pull rods still move freely.

Make three O-rings for each gland using your 9mm punch and a similar 5mm punch to remove the centre. Put some silicon grease on the shaft and push the rings down inside the union where the ferrule would have fitted. Put the O-ring retaining washer on and screw the gland nut, tight against the washer. Check the pull

rod still moves in and out without much effort. If it is too tight you may need to experiment with your O-rings. With my setup three O-rings nicely filled the gland space and gave an excellent seal.

Conclusion

The finished cylinders can now be utilised for many functions of pneumatic control. The most common one will probably be in a braking system. I have fitted two in a simple vacuum braking system using a converted electric tyre pump. My only initial problem was that the vacuum seal were to good and would not release till I disconnected the hose. This was overcome by making a practical control valve that turned the pump on in the full position, held the vacuum with the lever backed off enough to stop the pump and released the brakes in the full off position.

My train consists of four passenger cars two of which are fully braked, pulled by a petrol engined diesel outline locomotive with a hydraulic drive. Under normal operation I do not require any other brak-

ing than that provided by the gearbox which will bring the loaded train to a standstill from 8 kph down a 1 in 125 grade in two and a half train lengths. On test using the vacuum brakes only I can stop the train if it is loaded in one train length against the pull of the locomotive and less if I use engine braking as well. If there is no weight on the carriages full braking only locks the wheels with little retardation if I do not cut the engine back. Both braked cars have mechanically operated brakes as well which will override the vacuum if needed.

The electric vacuum pumps are not designed for continuous service so they are really only suitable for a simple system. I would expect one to be pretty badly worn after about twenty hours service but based on my usage where I would only use it about fifteen times on a running day for perhaps ten seconds per time, a total of three minutes per day. This would give me 400 days operation or around 33 years of normal usage.

Vacuum Check Valve

Design and drawing by Lindsay McDonnell

This design of a vacuum check valve, as used on vacuum brake systems, is one which has been in use on our club electric loco for 22 years. It is especially necessary on electric pumps that the check valve be absolutely air tight or the pump will cycle on and off incessantly. Steamers may also put one between their ejector and vacuum reservoir, if they use one.

The O ring seat can be machined with a D bit or a tiny bor-

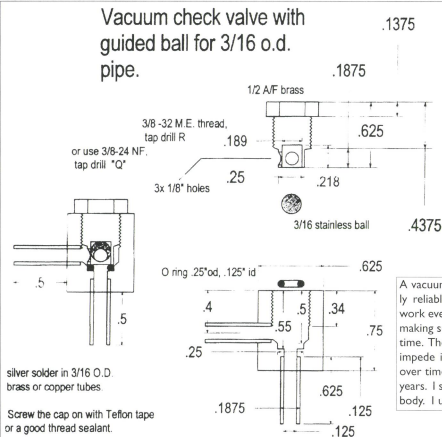
ing tool. Whatever you use, there must be an even finish to get a good valve. The cage over the ball makes sure that the ball seats right on centre in the same place every time. The O ring is easily replaceable as it is likely to get hard and inflexible after a couple of years use, leading to a slow leak. I recommend using a filter on the train line to keep fine airborne grit out of the system — a disposable automotive fuel filter is cheap and works well.

While on the subject of keeping vacuum leaks out of train lines, here are some things to watch for: make sure that the rubber hose is $\frac{5}{32}$ " bore so that it is tight on $\frac{3}{16}$ " OD tube. If it slips on too easily it may be too big. Make sure the dummy stub for parking the hose end on the car is $\frac{1}{2}$ " long and that it is smooth. Don't use steel tube in construction, only brass, copper or stainless tube. Steel will pit with rust and leak and abrade the end of the rubber hose. Check the connecting hoses for tiny cuts or cracks. Bend them around and inspect before attaching to cars.

How do you find the leak in a train's brakes? Start at the loco and plug the line at the tender, and apply the brake fully. Then set it to hold position and see if the vacuum holds. If good, work back, car by car, until you find the culprit. Take that car out for inspection and check the rest.

A vacuum brake system for $7\frac{1}{4}$ " trains must have absolutely reliable check valves that will hold vacuum all day and work every time. This valve can give the desired reliability by making sure the ball seats in exactly the same position every time. The ball has .0015" clearance to guide it, but not impede it. O-rings do break down and lose their elasticity over time so you may have to replace them every couple of years. I silver solder in the $\frac{3}{16}$ " tubes first, then machine the body. I use a $\frac{1}{4}$ " bit for the O-ring seat.

Vacuum check valve with guided ball for 3/16 o.d. pipe.



Ryan's Stirling Cycle Engine

by Peter Lukey and Ryan O'Halloran

Ryan O'Halloran is a 15 year old student attending Trinity Anglican School, just south of Cairns in Queensland.

For the **skills** section of the Duke of Edinburgh Award bronze level, Ryan asked if he could build a model of something in my home workshop. After agreeing, I made a few suggestions and Ryan chose to build a Stirling Cycle hot air engine to the design of David J Gingery. David's book describing this engine was purchased and studied. After some essential instructions in workshop safety, Ryan started by making a fabricated steel base rather than a casting as described in the book. As he gained skills, Ryan progressed from bench work to drill press and then onto the lathe.

At an early stage a search for a suitable aluminium flywheel was made with the result that one of the regular *AME* advertisers had one cast for Ryan from a pattern normally used for cast iron flywheels. The rest of the model was built to the instruc-

tions with some minor variations in dimensions to suit available materials.

Ryan spent about 2 hours a week in the workshop over a period of 15 months, with the odd interruption from examinations and sport commitments. He is to be commended for his effort as a first attempt at metalwork. I am sure the model would have been favourably judged in the Under 25s Encouragement Award if it had reached Evandale before Easter. The parcel containing the model was delayed in the post and not delivered until after the Easter break which was very disappointing. It was returned in just one weekend!

The engine runs well using either methylated spirits or kerosene in the burner.

Builder's notes from Ryan

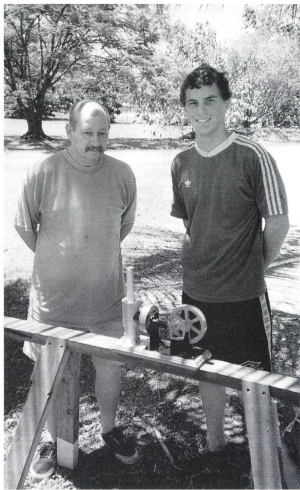
(Taken from the notes accompanying his Under 25 entry form)

The Stirling Cycle engine concept gets its name from its inventor, Reverend Robert Stirling, a minister of the Church of Scotland. Simply, the Stirling Cycle engines are closed engines, which means that the working air is used over and over again. Stirling's first patented hot air invention dates back to 1816.

While building this model I used a variety of hand tools to construct the frame parts, linkages and flanges. These included

During construction I was able to learn and use confidently two machine tools — a $3\frac{1}{2}$ " x 19" centre height metal lathe and a $\frac{5}{16}$ " capacity drill press.

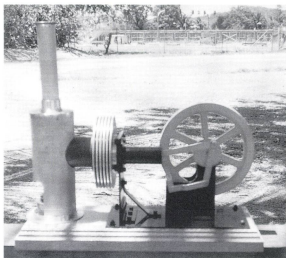
Lathe tasks included turning, facing, drilling (with tailstock chuck), boring and threading using a tailstock die holder. Some of the materials used were steel rod and plate, brass rod and sheet and aluminium rod and sheet.



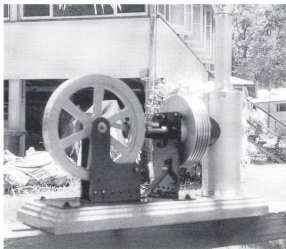
Peter and Ryan admire the engine prior to its unfortunate adventure with Australia Post.

Although I completed 80% of the model there were times when only the skills of the experienced (i.e. Peter) could accomplish the required parts and the assembly needed. These tasks included brazing of cylinder, bearing and fuel tank, tapping small holes, milling a slot in the displacement cylinder bearing, finishing the cylinder bore and some finish machining and rolling (and assembly of the burner casing). The machining of the power cylinder bore and the displacement cylinder ends were done by Peter outside as the available lathe did not have the capacity or accuracy to do the job properly.

(It was most unfortunate that Australia Post mislaid Ryan's engine for two weeks in transit to Evandale. He will still be eligible to enter the Stirling Cycle engine in the *AME Under 25s Encouragement Award* when the convention comes to Townsville in 2005. I hope he chooses to do so ... Ed.)



Ryan's completed Stirling Cycle engine ...



... And a look from the other side

AME always welcomes articles from and about beginners

Tracks 'n' Trees

Put a garden in your railway!

by David 'Doc' Wescombe-Down

Early this year, my wife and I exchanged our 5" loco and riding truck for a large quantity of O gauge items which were added to our existing collection. We decided to retrofit a 32mm track into the 13 x 3 metre garden area (including fishpond) available at the time.

We are both avid gardeners, bower birds, materials recyclers, fans of things-in-miniature and share preferences for the practicality, selectivity and affordability of a smaller gauge set up which we can enjoy at home, whenever we wish, with whomever we wish. Enter the garden layout.

In addition, we had a home workshop with a range of gear with which to pursue model engineering in small scales:

- 4.5" swing round-bed lathe
 - lathe accessories, tools etc
 - 12 speed pedestal drill
 - taps, dies, reamers etc
 - complete Dremel® workshop
 - arc welder
 - soldering stations
 - electric and cordless drills
 - angle grinders
 - bench grinders
 - cut-off saw
 - chassis punches
 - bandsaw
 - metal nibblers
 - 16 cfm compressor
 - scribers, callipers, verniers etc
 - air tools
 - files and other hand tools
 - drills, nuts & bolts etc
 - workbenches and floor space
- and a reasonable scrap box of suitable steel bits and pieces. Nothing flash, but it all does the job!

So we are happy to pursue model engineering in the smaller scale. The garden layout provides a venue to operate the end products of effort, and we are happy to combine ready-to-run commercial items with our own creations. Next step is a coal-fired steam locomotive.

The layout was constructed over four weekends, allowing for the other normal family life activities, and from my mental picture, not a drawn plan. In spite of this, the whole arrangement has worked out extremely well for us.

Recycled 100mm diameter CCA-treated pine posts were cut to facilitate an elevated track bed — 32 sections 300 to 650mm were used, and concreted in holes produced by the 'Armstrong' method. Each 'postlette' received one full bucket of concrete mix to keep it happy.

The local DIY store let us have forklift-damaged 40kg bags of concrete mix for one dollar each, and eight of these were used. If we had to describe our garden layout, we would probably call it: "an elevated, figure-8, dog bone with flyover"

The 'dog boning' was necessary to pass around the existing railway-sleepered 2.4 x 1.5 metre fish pond and two established trees. Allowance was made for the deciduous habits of some flora and the air-jet nozzle on the compressor comes in handy for the 'pre-operational cleaning blast'. An existing slate/concrete patio and path lined one side of the area, and a metal boundary fence, the other. Hence the 'retrofit'.

140 x 19 mm PAR treated pine planks were used for the track bed, and secured to the post tops with Liquid Nails® and two galvanised coach screws. 27 metres of track bed was thus established.

We purchased 1 x 2 metres of Eildon 276® charcoal marine carpet to use as a sound buffer under the tracks, and cut it into strips which were glued to the track bed with Liquid Nails. Peco Streamline® single track has been installed on the carpet strip



Track bed for the first loop and flyover



Track laying



More track checking



Mixing UK and USA is OK when checking track continuity

using plated pins, and three large buckets of dolomite were required to ballast the layout. Ballast integrity is achieved by using watered-down Aquadere® timber adhesive. Rail joints are soldered. Some UV protection to the plastic track components can be gained by painting them with masonry paint, but as our

layout is well-shaded, we did not bother to do this.

We have 144 metres of extruded brass track in storage, and plan to hand lay our next layout on marine ply sleepers, but there is no urgency to do that.

As the posts were installed, approximately 800mm apart and with about one metre radius in each end loop, their levels were established by eye, so that the track would NOT be billiard table level — good electrical continuity, smooth joints and curves, yes, but the planned inconsistencies would typify a branch line anywhere in 12 inches : 1 foot scale.

Moss rocks have been arranged as a backdrop to one section of the track to simulate hillslope, a steel bridge is intended for the flyover section, and a batch of dwarf conifers functions as "the forest". Agapanthus, baby tears, lobelia, self-sown nasturtiums, miniature daisies, curry plant, jonquils, alyssum, three varieties of mint, Mondo grass, chamomile and various ferns have been planted appropriately. A single ex-Ghan railway sleeper has been set as a bench seat inside one of the track loops under a plum tree. A neighbour's gift of an operational ex-SAR signal tower is yet to be installed as a further conversation piece.

Total cost of the construction and track was \$658.00 plus our own time.

Only one set of DC feed wires is required and all types of 'shorty' rolling stock are at home here: 0-4-0 to 0-8-0, even F7 and F9 diesels, electric rail, battery and steam; a contented mix of 'homebrew', Atlas, Lima, The Big Big Train, and Rivarossi. The mix obviously includes UK 1:43 and USA 1:48 scales, and although we keep the consists separate, we do not notice any difference between the two scales. At least two scenic modules are planned: one a small farming community, and the other, some type of rural industry utilising a model stationary steam engine and belt drive. We have stored some long bogie wagons and coaches for phase two (the hand laid brass track) but, for now, we are quite content to run our tail-chasing shorty trains on their two-minute laps while the next meal percolates on the Weber kettle and a stout or

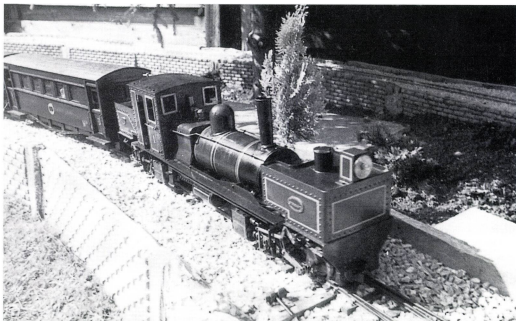
glass of red replaces the essential bodily fluids.

We don't have fairies at the bottom of our garden, but we do have trains — lots of them!

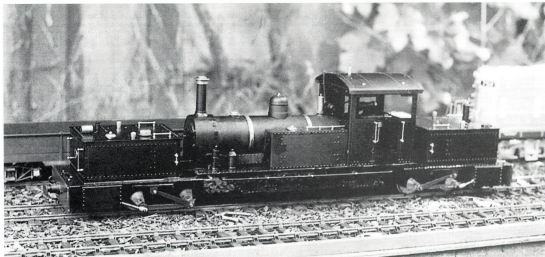
Garratts in the Garden

The following three photos and the accompanying notes were supplied by **Michael Bickford**. The photos on the next page were taken by him.

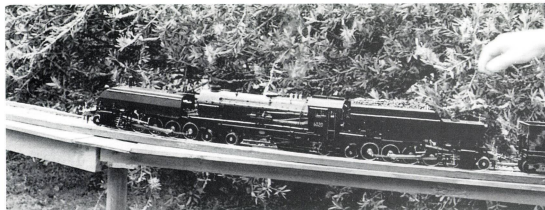
A 16mm scale, 32mm gauge live steam model of the Tasmanian Government Railways K1, the world's first Garratt locomotive. This loco was scratchbuilt by Alf Bennett in the UK with 4 working cylinders, internal gas firing and 2-channel radio control for throttle and valve gear. The flexible joints for live steam were made with O-rings and swivelling joints. Details for construction of this loco were serialised in *16mm Today*, the club magazine of the Association of 16mm Modellers, also in the UK. This photo was supplied by Alf, who sadly passed away a few years ago.



A commercially available free-lance 16mm scale Garratt produced by Salem Models in the UK. The loco has 4 working oscillating cylinders, external gas firing and is manual control. Gauge is adjustable for either 32mm or 45mm. The flexible joints for live steam are made with thick walled silicon tubing inside a mesh sleeve, with a working pressure of 30 psi. This particular one belongs to Tony Woodroffe and was photographed on Gordon Watson's Paradise Valley Railway. Gordon is a regular advertiser in *AME* and is probably better known as Argyle Locomotive Works



Aster Models Gauge 1 NSWGR AD60 Garratt. This magnificent scale model belongs to Lindsay Crow and was also photographed on Gordon Watson's Paradise Valley Railway in Victoria's scenic Dandenongs. It is very powerful and yet very controllable, with all cylinders working, boiler internally fired on meths, water in tanks, axle pumps, etc.



Australian Model Engineering



#14*	November	1988	\$5.00
#15	December	1988	\$5.00
#16	January	1989	\$5.00
#17	February	1989	\$5.00
#18	March	1989	\$5.00
#20	May	1989	\$5.00
#21	June	1989	\$5.00
#25*	October	1989	\$5.00
#26	November	1989	\$5.00
#27	December	1989	\$5.00
#28	January	1990	\$5.00
#30	March	1990	\$5.00
#31	April	1990	\$5.00
#32	May	1990	\$5.00
#36	May-June	1991	\$6.50
#37	July-August	1991	\$6.50
#38	Sept-Oct	1991	\$6.50
#39	Nov-Dec	1991	\$6.50
#41	Mar-April	1992	\$6.50
#42	May-June	1992	\$6.50
#43	July-August	1992	\$6.50
#44	Sept-Oct	1992	\$6.50

#45	Nov-Dec	1992	\$6.50
#46	Jan-Feb	1993	\$6.50
#47	Mar-April	1993	\$6.50
#48	May-June	1993	\$6.50
#49	July-August	1993	\$6.50
#50	Sept-Oct	1993	\$6.50
#51	Nov-Dec	1993	\$6.50
#52	Jan-Feb	1994	\$6.50
#53	Mar-April	1994	\$6.50
#54	May-June	1994	\$6.50
#55	July-August	1994	\$6.50
#56	Sept-Oct	1994	\$6.50
#57	Nov-Dec	1994	\$6.50
#58	Jan-Feb	1995	\$6.50
#59	Mar-April	1995	\$6.50
#60	May-June	1995	\$6.50
#61	July-August	1995	\$6.50
#62	Sept-Oct	1995	\$6.50
#63	Nov-Dec	1995	\$6.50
#64	Jan-Feb	1996	\$7.50
#65	Mar-April	1996	\$7.50
#66	May-June	1996	\$7.50
#67	July-August	1996	\$7.50
#68	Sept-Oct	1996	\$7.50
#69	Nov-Dec	1996	\$7.50
#70	Jan-Feb	1997	\$7.50
#71	Mar-April	1997	\$7.50
#72	May-June	1997	\$7.50
#73	July-August	1997	\$7.50
#74	Sept-Oct	1997	\$7.50
#75	Nov-Dec	1997	\$7.50
#76	Jan-Feb	1998	\$7.50
#77	Mar-April	1998	\$7.50
#78	May-June	1998	\$7.50
#79	July-August	1998	\$7.50
#80	Sept-Oct	1998	\$7.50
#81	Nov-Dec	1998	\$7.50
#82	Jan-Feb	1999	\$7.50
#83	Mar-April	1999	\$7.50
#84	May-June	1999	\$7.50
#85	July-August	1999	\$7.50
#86	Sept-Oct	1999	\$7.50

Back Issues

#87	Nov-Dec	1999	\$7.50
#88	Jan-Feb	2000	\$7.50
#89	Mar-April	2000	\$7.50
#90	May-June	2000	\$7.50
#91	July-August	2000	\$7.50
#92	Sept-Oct	2000	\$7.50
#93	Nov-Dec	2000	\$7.50
#94	Jan-Feb	2001	\$7.50
#95	Mar-April	2001	\$7.50
#96	May-June	2001	\$7.50
#97	July-August	2001	\$7.50
#98	Sept-Oct	2001	\$7.50
#99	Nov-Dec	2001	\$7.50
#100	Jan-Feb	2002	\$7.90
#101	Mar-April	2002	\$7.90
#102	May-June	2002	\$7.90
#103	Jul/28 August	2002	\$7.90

*Indicates very low stocks.

AME Retail

PO Box 1403
TUGGERANONG, ACT 2900
AUSTRALIA

Ph/Fax: (02) 6292 1938

email: ipoliver@webone.com.au

(If phone is unattended please leave a message
and we'll get back to you)

Prices Include GST and Postage In Australia

New Zealand: Add \$2.00 per issue

Other Countries: Add \$3.50 per issue

*Note: We pass the reduced rate of postage rate
per magazine with larger orders on to you.*

Build Your Own Workshop Press

By David Dunnett

Drawing and photo by the author

At a recent club meeting one of the members demonstrated some techniques of forming, bending, folding and punching using my small hydraulic press and simple, easily constructed tooling.

The design and construction of the press was based on

1. Storage space available in my garage/workshop
2. Materials on hand
3. Observations of other presses domestic and commercial
4. The availability and cost of other items, i.e. hydraulic jack, springs and casters, as the press had to be mobile.

Design and construction are only limited by your imagination, physical space and of course, the size of the work to be handled. The basis of my press is a 6 tonne hydraulic jack purchased at a local automotive parts store. The height of the jack when lowered/extended and a rea-

sonable working height determined the general overall height of the press.

I chose to operate the jack in the usual manner and accept the limitations of the ram travel. However, with some small modifications it is possible to use it upside down. The alternative is to purchase a better "brand name" jack that will work upside down and thus gain the advantage of the usual screw-out adjustment when setting up a job. The length of stroke, however, remains the same.

For a start, I suggest you visit your local tool shop/steel outlets and see what is available in ready-made presses and/or materials. A trip to your local tip recycling centre may yield some useful materials. After doing some rough design and cost calculations you can decide which way to go — buy or build.

As a guide as to what you may expect my press will just take a 90° bend in a piece of 25 x 6mm black MS flat.

The basic dimensions and construction are shown in the drawing but feel free to vary the design to suit your circumstances. Construction was based on the fact that I had obtained a suitable quantity of used U channel, some heavy angle and other steel.

After making a reasonable sketch, the material was measured and dimensions added to the sketch before cutting commenced. As parts were cut they were laid out on the concrete drive to get a visual idea of the project. At this stage some modifications were made to better utilize available steel. The I section on top was fabricated from two pieces of U channel welded together full length, top and bottom. To aid construction in the welding phase, the moveable jack support was cut the same length as the bottom channel and slightly reduced in length later on.

Drill the 1/2 inch

side holes in both vertical members. The two vertical members were laid out on the workshop/garage floor ('er in doors' car was moved out for the duration), the base cross piece added and the jack support located up near the top where it would not get in the way during the tack welding operations.

After the basic assembly was clamped together using 3-foot sash cramps and leveled up, it was then tack-welded and checked for squareness and wind (as in wind the clock) using a 4-foot level and the Mark 1 eyeball. Final welding of the basic frame was then completed and again checked for squareness and wind.

The base angles were then drilled to take the 4 swivel casters and welded to the frame.

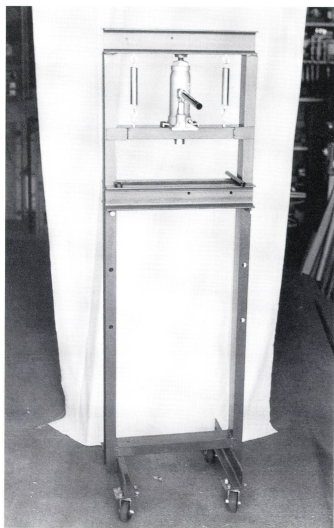
The next task was to construct the moveable jack support by reducing the length by 3mm and welding on the "ears" at each end. I made the mistake of not allowing clearance for free sliding up and down and had to resort to filing a suitable clearance. I suggest using some 1-1.6mm spacers under the "ears" on one side to give the necessary clearance.

Two lengths of channel were utilized for the work platform with two pieces of RHS welded in between as cross members.

When welding the cross members in place, I made the mistake of welding them in square with an allowance to enable the platform to be lifted one end at a time for height bars. A better method is to weld the cross members on an angle as shown in the drawings. This restricts the horizontal movement whilst allowing the platform to be lifted for adjustment.

Drill and tap the holes in the cross head and clearance holes in the jack platform for the eye bolts for the springs. I welded a short tube to the cross head to prevent the jack ram from slipping and after alignment, fitted two angle clamps to secure the foot of the jack.

A removable press spigot was made to screw into the underside of the jack support. The idea was that this could be replaced with special "tooling" as required for forming or other jobs. This completes the construction of a very useful addition to my workshop.

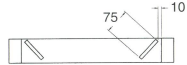
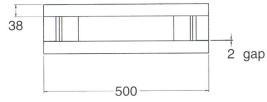
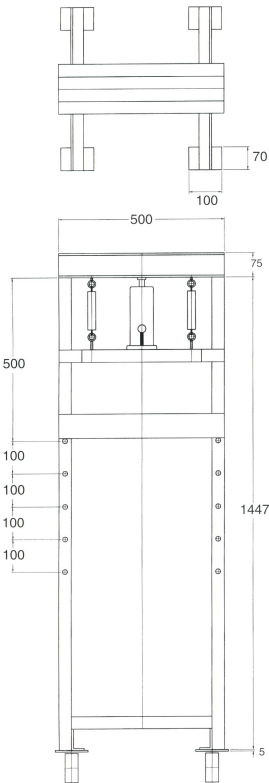


The author's completed press is ready for work

**AME — Reading
about it is the next
best thing to being
there!**

WORKSHOP PRESS

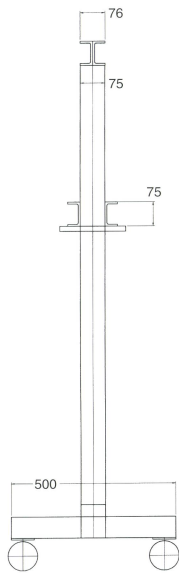
All dimensions are in mm.



Work Platform



Jack Support



Clare Valley Model Engineers

by Don Springbett

For many years, too long to tell, HO had been our thing, then out of the blue we moved, and there was no room for the HO. However our town has a nice lake and a large unused park. The thought occurred *what's wrong with a real train, like 7 1/4"*

Having cut my teeth on heavy earth-moving equipment and been a diesel mechanic for some years, I could not help myself but to start a CLP in the Indian Pacific colors. A train without a track close to home is not a good idea. With the experience of Terry Tresize, who for many years has been running a 5" steam loco and a couple of local enthusiastic people, we formed a club, and convinced the Council that we had a good use for Inchiquin Lake Park.

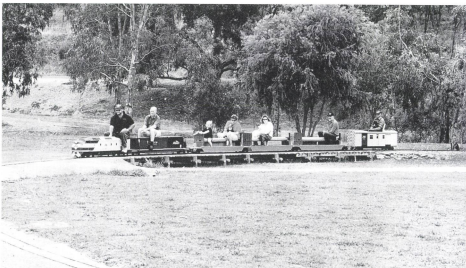
Slipping the hands deep into the pockets, we bought very cheaply 500 metres of aluminium track off the Pt. Gawler beach. By the time we got it home 70% of the sleepers had fallen off. The lesson was simple chemistry, do not put galvanized screws next to aluminium — metal electrolysis works well in salt air. So with 9000 stainless screws, a lot of scrounging around the local carriers yards for loose pallet boards (thanks Mr Chep) that cut up into excellent sleepers, we were ready to make track.

In September '98 the first section of track hit the ground, and in three months with three to four workers we completed a 460 metre circuit and unloading ramp.

The CLP, lacking a lot of bodywork, took to the track and found a lot of rock and roll, which we gradually packed over the next few months. A good summer rain helped a great deal to compact our ballast



Inchiquin Lake is full and some new thinking is required for drainage



Drainage problem solved with a wooden viaduct



A special high lift tip trailer made easy work of loading the ballast truck

and after the next winter the track has settled quite well. The next move was to do a proper test, and open to the public, but some one mentioned public liability.

Not a problem at all, thought us, our local broker is a mate — he will fix that for us. And we thought right, no trouble at all for about \$2000 per annum. With some research we discovered the AALS. Next job, form an incorporated club, write a constitution, write a set of regulations and pay the government \$150 for the privilege. Then the Council had to be covered, and this required an Occupational Health and Safety policy and of course a Rehabilitation Management policy to go with that. Oh yes, then a local engineer had to inspect and certify the track, amid the local louts trying to relocate some of it. However in a small town the grapevine information, some publicity in the local rag and staking down the track put paid to that problem. After training guards, duty officers and engine drivers, we finally got

AALS approval. Not bad, eh? Three months to lay the track and five months to clear the red tape, what sort of society have we got.

We enjoyed good public support from our small town and district, but come winter, dodging rain, setting up and packing up, carting things to and from an open space soon started to lose its shine. Drawing up plans for a station/club house and applying to the Council was easy. It never dawned on us that we would be considered as boys with toys and be rejected. Confronting the Council at the next meeting and being backed by a large group of people somewhat changed their opinion. Even with the support of Council, the Regional Development Board and the local MP could not get us a grant from the State Sport and Recreation Fund. We formed the opinion after several applications that the word *Recreation* was only there to make the heading look good. Perhaps our tunnel should be a soccer net and with a boot mounted on the front of our locos and a ball on the track to shunt around it might have helped. It helps to see the funny side I guess.

When your back is to the wall it is marvelous where support will come from. The local suppliers of materials made some generous offers and then out of the blue, a contract from the local Council was more or less dropped in our lap. The mowing and keeping tidy of the park, involving about 16 hours a week in peak periods, with all equipment and materials supplied. A job we gladly accepted.

Like all clubs there is a minority who do most of the hands-on stuff, and time and time again you hear a lot of complaints about this, but I believe that this is okay, because those with the ability and dedication can get on with the job. After all it is well known that a committee of one is the most efficient of all. We do have individuals who have both the time and the dedication to make things happen and are fortunate to have Colin, Bob and Ivan who are always there, and with the support of the rest of the members we now have a station.

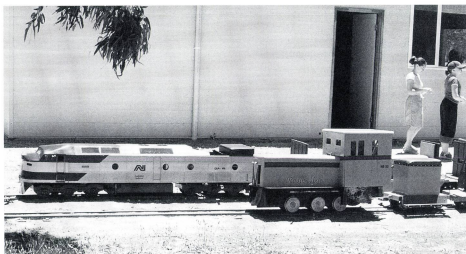
John Wakefield rang one day from Morphet Vale to advise that surplus to requirements there were 180 metres of old track going cheap. This proved to be a bonus for us. With weather conditions and other commitments, it took us about twelve months to get it laid, but now we have a passing track and some education on how much better steel track is than aluminium.

We operate on the 2nd and 3rd Sundays of each month when we get some locals and increasing numbers of tourists to ride our trains. Our ladies do well in the canteen with cool drinks, tea coffee, soup and confectionery.

Takings are low, but cover our insurance with a little left over for bits and pieces. Our windfall is the contract with the Council and with the new positive



Inchiquin Lake is a model boat haven



Don Springbett's petrol electric CLP and Colin Hean's converted ride-on mower Rosie Mae in front of our new station.

CEO the future looks great. Among our members we have three locos and a variety of rolling stock. A new member David is a keen electronics man and is busy sorting circuits for signaling. Our boating boys, Andrew, Craig and Robert have model powerboats and yachts well under

control. Our next move is install a turntable, steaming bays and make other clubs welcome.

(The Clare Valley ME is not in the AME club records. Perhaps someone could send some details for our next club listing — like track location, running days, etc. ... Ed.)

Workshop Hint

Cat litter soaks up oil

The kitty litter made from recycled newspapers is the ideal material for soaking up waste oil. It consists of very light, soft grey pellets about $\frac{1}{2}$ " long by $\frac{3}{16}$ " diameter. It is environmentally friendly and cheap. Leave it a day or two to soak up as much oil as it will take, adding more litter as necessary. The sun's warmth will speed it up a bit. Let it take up just enough that it is not overly wet. Scoop the lot into a plastic bag for disposal in the garbage bin.

Also use 'kitty litter' soaked in

kerosene (paraffin) to start the fire in the loco or the barbecue. However I advise against using it with petrol (gasoline) as that would be dangerous, and don't burn it when it has been soaked with oil because it smokes badly.

You can buy it quite cheaply from supermarkets in 5kg bags. One brand is called 'Breeder's Choice' Cat Litter. Do NOT confuse it with the gritty type based on granules of stone-like material.

— Peter Dawes

Wollongong's Famous Hot Pot Run

Rally or 5" gauge convention? This year's Hot Pot run was the biggest yet, with around 72 locomotives registered over the weekend. As well as the large number of locos there was, as usual, a large turnout of scale rolling stock, plus many visitors who came for a yarn and a look, leaving their models at home. I think that if this popular event becomes any more popular the ILS club's facilities are going to be somewhat overstretched. There were more visitors from interstate this year, particularly South Australia. Victoria, Queensland and the ACT were also well

represented and so, of course, was NSW. The Hot Pot itself got a good workout and many tins of soup and bread rolls were consumed over the weekend.

Unusually for the Queen's Birthday weekend run in Wollongong in recent times the weather was absolutely perfect both Saturday and Sunday, though Saturday night did turn rather cold. I am fairly certain that Helmut's nice warm mulled wine did not last near as long this time! A sleeping tawny frogmouth owl was not at all concerned by the activity in the steaming bays about 6 feet below his perch.



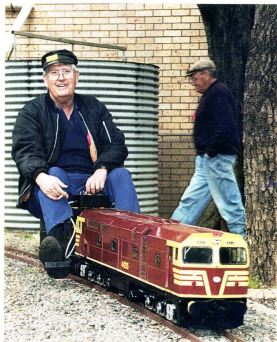
The Tullochs have restored the NSWGR 'J' class loco after many years in storage.



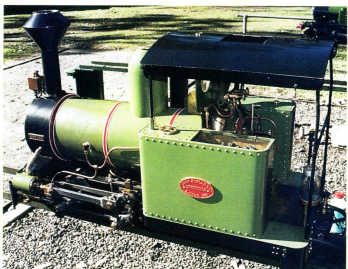
A nicely finished bottom emptying hopper wagon caught my eye as it passed in the middle of a long VR freight train.



Various goods trains ready to depart the north end of the yard



John Oliver enjoys a run with his battery powered NSW 442 class loco on the Saturday afternoon. Sunday was a bit different when the loco was a runaway and John was wounded as he tried to stop it. It appears that during the night someone disconnected it from the charger, not following the correct sequence which stuffed up the controller settings.



This unusual jackshaft driven Fowler belongs to Steve Gaal of the Moorabbin club. Prototype is in the Sugar Museum in Mourilyan, Q.



Peter Hoyer brought his D&RGW 'Mudhen' over from Adelaide



This is just one of Peter Hoyer's nicely finished items of rolling stock



Moriarty belongs to Mark Watson from Melbourne



Ray Lee's latest is this NSWGR 'S' class — 11 months work!



Victorian Railways were well represented this year. This is just part of the VR rolling stock which ran over the weekend.



Roger Barwick (driving) and John Maunder from the Mudgee club



Darin O'Brien now has a very appropriate rake of sugar cane wagons to haul behind his Bundaberg Fowler cane loco.



Ross Mainwaring has a drive of Darin O'Briens cane train

Traction Action



with David Proctor

Go 'day road steamers! A fairly short mix of traction action this time. I was sorting through some of my photos recently and came across a couple I took when I attended the NZ Convention in Blenheim a couple of years ago which could be of interest. You may recall from the article at the time that as well as the railways there were 3 miniature and two full size traction engines at the convention. The two big'uns were a Marshall and a Burrell, the Marshall on static display only but the Burrell was in steam all 4 days. For the Sunday night meal a steam pipe was attached to the Burrell and connected to a potato cooker, something I have not seen for years and a very civilised way to cook spuds. They tasted much better, naturally!

The 3 miniatures were a 4" Burrell, a 4" Fowler and a 3" Durham & North Yorkshire engine. Whilst our conventions are almost 100% railway oriented, the Kiwi conventions cater for a much wider range of model engineering enthusiasts.

A great book

A few months back I scored a really great book for my birthday. It is called *Traction Engine — Design & Construction, 1900-1930* by G.F.A. Gilbert. It is one of the best traction engine books I have come across and I reckon every enthusiast should have a copy. It is a hard bound

book with 342 pages and contains a wealth of material. The author covers every aspect of how traction engines were built and the variations which occurred between manufacturers. There are many splendid builders' photos and drawings. Each component such as boiler, wheels, etc. are dealt with in great detail and even accessories like firing irons and lamps are covered. You name it, it's there! Really, it is almost an encyclopaedia of traction engine construction and every time I open

it I learn something new.

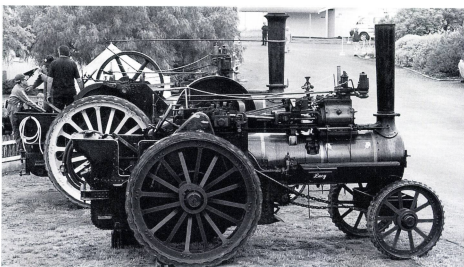
My good wife obtained my copy from Camden Miniature Steam Services in the UK (one of our regular advertisers) and it cost her around £39.00. I reckon her money was well spent!

A smaller Burrell

Hopefully, in each issue we are aiming to show at least one miniature road vehicle under construction.

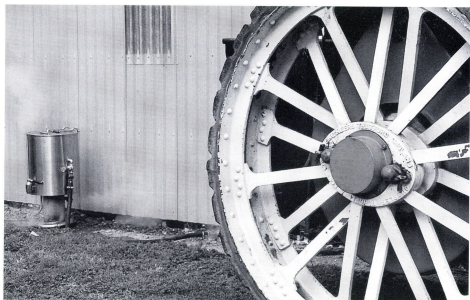
To kick off with, Jim Mitchell in Canberra is well on the way with his 3" Burrell single and will probably have it running for the Rally. He commenced this project some years ago and with the exception of the boiler, which was made by John Dew, it's all his own work. The livery Jim has chosen is that of the Midland Railway in England, a railway in which he has a 'passing interest' — crimson lake with black and yellow lining.

Jim reckons the most tedious part of the project has been cutting the gears. It couldn't have been too bad though as he has a spare set, slightly different to the ones now on the engine! When it is complete, this Burrell will be a very nice model



Above: The Marshall stands in front of the Burrell at 2000 convention in Blenheim, NZ

Below: Steam from the Burrell is piped to the potato cooker, not a hard job for the boiler.

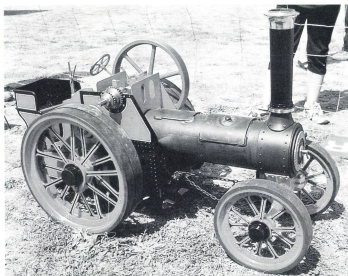


DESIGN &
CONSTRUCTION

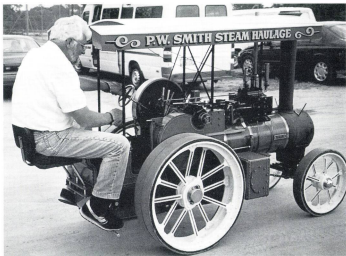
Traction Engine

1900 - 1930

G.F.A. Gilbert



Jim Mitchell's 3" Burrell at a historical engine rally in Queanbeyan



Does he know what he's doing? Well, he thinks he does! Your Editor enjoyed his drive of Peter Smith's 6" Ransomes at the rally last October in Mannum Photo: Jeff Schaefer

and a real credit to Jim — I believe it is his first foray into the world of live steam. I look forward to the article he is going to write for us!

New road steam trophy

AME is keen to encourage the growing popularity of miniature road steam in Australia and accordingly is instituting a new perpetual trophy to be awarded at the annual Miniature Traction Engine & Road Steam Rally. It will be known as the **AME Traction Action Trophy**. In keeping with the informal atmosphere of the rallies, the trophy will be awarded by popular vote (secret, of course). Each person registering will get a slip of paper to vote with and the winner will receive the trophy at the Saturday night dinner and will also receive a complimentary one year

subscription to AME. The only catch is a real hardship — the winner has to arrange to have the trophy at the following year's rally!

On the home front I have been plugging away, albeit very slowly, with my 3" Allchin and have spent the last couple of weeks repairing/restoring some fairly battered old patterns so that I can get a few more castings done. These patterns were made many years ago by Col Jones and have had a lot of use since. Unfortunately some are missing so it would be great if someone out there can save me some work. What I am looking for are patterns for the flywheel (and cylinder for a mate). If you can help, I would be most appreciative and would return them to you in good condition.

Normally I exclude photos which

include myself as I figure the editor already has enough space in a magazine. I was "encouraged" to use this one to show that I can do more than drive this uninspiring computer!

This is the last issue of AME to come out before the Miniature Traction Engine & Road Steam Rally in Canberra in October. It is going to be a great weekend, with a fabulous venue and I hope to see you all there! Until next time, clear roads and plenty of steam.

Traction Action ... is your column. This is the place to talk about road steam, show us your models, ask questions or whatever. Your call! How about it?

14th Australian Miniature Traction Engine & Road Steam Rally

at the historic

Tuggeranong Homestead
Canberra

18 to 20 October, 2002



Come to the National Capital in spring for what will be an outstanding Road Steam Rally.

Tuggeranong Homestead is one of the original farms in the Canberra region now surrounded by suburbia, a heritage protected site. The roads, paddocks and old buildings make the perfect venue, with plenty of water and lock-up storage. Some limited camping is allowed on site but there are no facilities. Friday night will be a welcoming BBQ, and a sit-down dinner on Saturday night in the on-site restaurant. Some events have been planned and you may even win a new perpetual trophy! Several motels and a camping ground are no more than 10 minutes from the site. Costs have been kept down so you can't afford to miss out!

For full details on the Rally, registration, etc. contact the organiser, John Oliver

Phone/fax (02) 6292 1938 or email at: jplover@webone.com.au

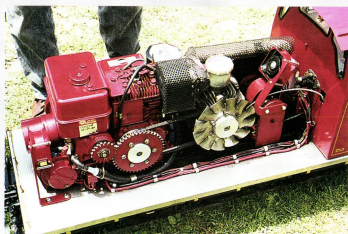
Time is running out — Register now!!!

A New Standard in Diesel Locos

by Dave Giles



Jim Curtis' completed NZR Dsa shunter. Photo: Dave Giles



Not much spare space under the hood.

Photo: Dick Langford

A 'Diesel' locomotive that really took my eye at Havelock this year was the beautifully detailed NZR Dsa 7 1/4" gauge shunting locomotive built by Jim Curtis from Dannevirke, New Zealand.

Jim had arrived at the Keirunga Park Railway a few years back with his steam locomotive only to find that there was a total fire ban in place and he could not run it. This prompted him to research an alternatively powered loco which could operate in all climatic conditions. The NZR 0-6-0 Dsa shunting loco was chosen in a suitable scale to suit 7 1/4" gauge track. The prototype No. 263 was operated by NZR in the Invercargill yards from 1957.

The model loco is powered by a 4hp Briggs & Stratton engine that has been suitably muffled to eliminate the 'lawn mower' effect. The engine did not have electric start so Jim machined up a ring gear and grafted a suitable 12 Volt starter motor onto the crankcase. He said a shoe horn was necessary to get all the parts to fit into the available space. Cold air is ducted from the front to bring in air for engine cooling and to supply the carburettor. An Eaton model 7 hydrostatic unit was chosen as the best way to turn 3000 motor rpm into 400 wheel rpm. The Eaton unit gives the driver smooth control of the train and includes reverse gear and dynamic braking all in one unit.

Jim has made a superb job of detailing the loco, outside the cab and even in the engine bay. The cab has controls set out as per the prototype. There are windscreen wipers, shunters' step lights, opening doors on both sides of the engine hood, makers plates, etc. all finished to perfect scale. The driver's ride truck is scaled from an early NZR four wheel LA goods wagon. This has



Even the hidden parts are nicely finished.

Photo: Dave Giles

space under the driver's seat for a starting battery, shoe horn, a cut lunch and a water bottle. Jim kept a note of the time that went into the Dsa project and the total was just over 2000 hours. It is really good to see a superbly finished project whether it be petrol, electric or steam powered.



It could almost be the full size version!

Photo: Roger Reynolds



How's this for a neat cab?

Photo: Roger Reynolds

Hamilton Open Weekend — March '02

Photos by Chris Simmonds, captions by Valerie Clark



Jim McLean with his shortened Hoots Mon — now a half cut 0-6-0!



Sandy River (Eric Burns) on the turntable



A driver's view when heading towards the bridge over the lake and thence travelling back to the station.



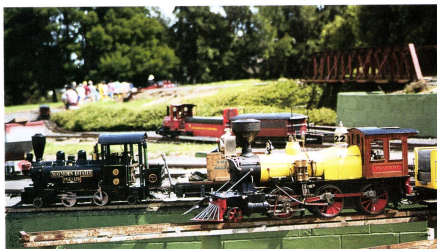
John Harman heads L'il Lima towards the 2nd tunnel



The station was a hive of activity



Ron Salisbury with his 3 1/2" loco



A scene at the steaming bays

A Simple Rail Scrubber

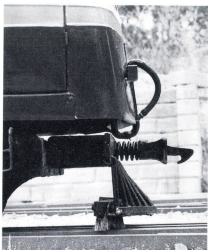
by Jack Stanbridge

Drawings for publication by Dave Adams

Keep your tracks clean and clear! Powered units at Castledare Miniature Railway are being fitted with a "rail scrubber" to keep stones and ballast off the tracks, thereby minimising derailments.

Diesels, steam locomotives, rail cars, etc. can all easily be fitted with this "brush". The brush, which is not to be too stiff, can be cut to fit behind the cow catcher and extend to just below rail height. On a test run, a unit fitted to *Betsy*, a diesel unit, ploughed into a 'heap' of ballast on the track, 3" deep (something we often get at Castledare, out in the "Wetlands" on our 6k of track). *Betsy* cleared the track of ballast and continued to run without derailment. Since the brushes have been fitted, we have had no derailments from stones on the track.

Brushes like these are made by our local brush manufacturer. Cut into 75mm lengths and bolt to cow catcher with $\frac{1}{4}$ " (6mm) bolts. They remain out



The scrubber brushes as fitted to the rear of the cowcatcher of the author's WAGR "Governor" class diesel rail car.

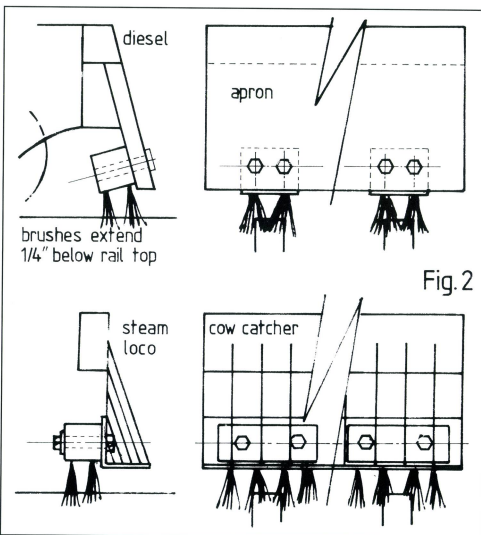
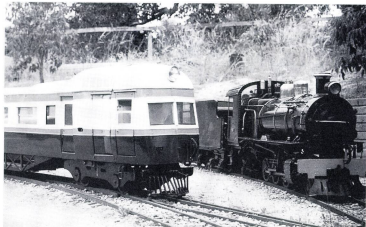
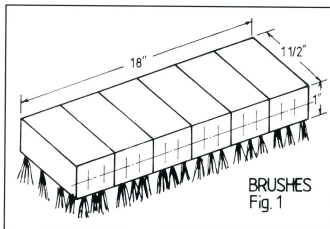


Fig. 2

of sight. We have never yet had to replace these brushes and they have scrubbed miles of track. On cow catchers, the brushes need to be wider on steamers

than on diesels. If they are mounted on the bogie frame on diesels they follow the track.

(The late Jack Stanbridge was a long time contributor to AME and this was his last article, written shortly before his death. ... Ed.)



You wouldn't know it but both these models are fitted with the brushes.

Club Roundup

compiled by David Proctor

Balcatta, WA

For the AMRA Exhibition the Society put on a large model engineering display, together with the traditional train rides, at this major annual event. Ernie Redford has laboured hard recently to convert the club *Blouffy* loco to gas firing for use indoors, and it ran tirelessly for the whole weekend, under the care of various drivers. The model engineering display attracted large crowds all weekend, with a good selection of working steam, internal combustion, air powered and hot air engines in action. There was also an impressive array of static exhibits, including partly constructed models, a sectioned boiler, completed models, computer simulations of steam valve gear, videos and more.

The new club house building is now finally completed externally, with the outer walls done some time ago and now the roof and end gables in place. It has all but reached lock-up stage. The fire stairs have been fitted and rendering has been done around the window mounts so the windows can now go in. Excavations for the power have commenced.

The June Run Day turned out fine despite the gloomy weekend weather forecast. A couple of new features of the Run Day were provided firstly by Andrew Manning's Foden steam truck towing a snappy trailer with pneumatic tyres. A lot of our happy patrons availed themselves of a ride along the BMX road and back. Another variation to steam locos was provided by Stuart Martyn, with his internal combustion engines.

Northern Districts Model Eng. Society

Location: Vasto Place, Balcatta

Public Running: Last Sunday

<http://www4.tpg.com.au/users/jimclark>

Berry, NSW

Berry's recent AGM returned Trevor Lawrence as club president, Tom Reinhold as secretary and Iain Harris as Treasurer. It was also decided to change the running day from the second Sunday to the first Sunday of each month. There will also be running on the third Sunday when there are 5 Sundays in the month. A calendar is available so as to avoid confusion. Please contact the secretary for a copy on (02)42971852 or tombindi@vtown.com.au. The club looks forward to visitors on its

Invitational weekend 18th to 20th October 2002. Some new track is being laid in the station area to allow a bypass of the congestion that occurs in the station area. The club also has produced a historic photo CD, which contains 161 photos from the old railway site. The CD is available from the club (PO Box 324, Berry NSW 2535) for \$17.00 including postage.

Berry Railway Inc

Location: B215 Princess Hwy, Jaspers Brush, (about 5k south of Berry)

Members Running: 1st Sunday (3rd Sunday when 5 Sundays in month)

Blenheim, NZ

Work is continuing on the new trolley shed with the roof having been poured. The concrete facade has also now been poured in preparation for the roller door fitting, and yet to be completed are the brick arches over the openings. All is now starting to take shape, and will be a great asset and should house 20 plus trolleys.

The flying site at Hardings Road has taken on all the comforts of home with the caravan in position and plans are afoot to give it a new coat of paint to prolong its life. The boat pond has also seen much activity, some unwanted leaks that appeared have been dealt with and the pond now holds water.

The annual float fly-in at Lake Argyle on the 5th May was a great success. Eleven of our members were there.

The regatta was held on the 1st and 2nd June at our club grounds, recent efforts to repair the pond gave boaters an excellent stage to perform on. Boats from Christchurch, Palmerston North, Nelson, Picton, plus our own one or two, brought a big variety of models ranging from the Inter-Island Ferry, yachts, whale chaser, motor launches, fishing vessels of various sizes, freighters and a U boat.

Marlborough Associated Modellers Society Inc

Location: Brayshaw Park, Blenheim

Public Running: 1st Sunday

Bulla, Vic

Sufficient of the 3 1/2" 5 inch track has now been laid and connected, with the installation of the point sets near the peppercorn trees, to have a decent run without a continuous circuit. The brickworks

at the Station are still progressing, with one wall of the ticket area still to be completed. Most of the upright steel beams for the roof and verandah support have been erected, and in the gazebo area the concrete has been poured. It is estimated that there are 50 man hours of work still to be done in this area before the roofing can be finalised.

Tullamarine Live Steam Society

Location: 15 Green Street, Bulla

Public Running: 1st & 3rd Sundays

www.netconnect.com.au/~dls

Burnaby, BC Canada

The Tuesday work parties are continuing. The lifted track in the west cut has now been reinstalled and track repairs have been done in several places. Our new policy of requiring that all derailments and other incidents be reported to the track manager is enabling us to spot problems sooner and identify whether a car or a track is the problem. Work is continuing on connecting the storage racks on the north wall of the car barn to the ground level track. We are already using the racks for gondola storage by lifting the cars into place. The fence shielding the racks has been completed.

After a month of careful consideration and discussions about design and finances, the executive has now voted to build a new club locomotive. It will be an F7 outline battery electric locomotive in 1.6" scale. The battery compartment will be sized to take either the same large custom 24V battery that is used in our club electric #7701, or 4 Trojan 6V deep cycle batteries. It will be painted in CN Heritage colours, and will be designed so that various maintenance operations can be done by one person. They have chosen the General Motors F7 in 1.6" scale based on prototype dimensions divided by 7.5 for 7 1/2" gauge.

The Hat's Off Day parade on June 1 was a great success. Our traction engine was run down the street hauling our big old trailer (massively refurbished) with the club Mogul #73 on board. There was one surprise; hauling that heavy trailer put the fuel consumption WAY up!

British Columbia Society of Model Engineers

Location: Rainbow Creek Station, 120 Nth Willingdon Ave., Burnaby, BC.

Public Running: Saturday, Sunday & public holidays, Easter to Thanksgiving

Canberra, ACT

The detailed proposal for the new track in Queanbeyan has been presented to the Director of Parks and Gardens for the Queanbeyan City Council. The council officials are now preparing their plans for the whole of Bicentennial Park which is being designed around our railway. The next stage will be for the club to make a presentation to a full sitting of Council and then it will be a case of waiting.

In the meantime, back at Kingston, further improvements continue to contribute

to the safe running of the railway. The level crossing access to the party area has now been concreted which makes it much easier for prams, etc. to cross the track. On the track itself, the safe working has been further enhanced with the addition of extra signals and track circuiting. Now if everyone obeys the signals and follows procedures it should all run smoothly.

Members are now getting ready for the annual Malkara Model Railway Show which is a good money spinner for the club and a great opportunity to promote our club to the wider community. Organisation for the annual Traction Engine and Road Steam Rally at the Tuggeranong Homestead on October 18 to 20 is well under way and it looks like it is going to be the biggest and best yet.

Canberra Soc of Model & Experimental Engineers

Location: Geijera Place, Kingston

Public Running: Last Sunday

Casino, NSW

Beef Week was a great success. Four of our "out-of town members" arrived on the Friday morning to set up camp and stay for the whole 10 days — Tom Millar arrived with the prairie #437 and two new 8-foot straddle carriages, Graham Sciffer and Michelle Barnes (whose loco, #1207 was already in the engine shed waiting for them) and Gilbert Simpkins arrived with his traction engine *Thor* all polished up and ready to be placed in the Mitre10 Hardware Store on display till the parade on the following Saturday.

We offer our heartfelt thanks to the visitors from other clubs who arrived on Tuesday morning and set up their tents at Old Casino Station — Dave Muscat, Barrie and Peter Moore from Ipswich steamed up their 5" gauge locomotives. On Thursday morning from Townsville were Michael Davern and his wife with their 7 1/4" gauge *Heidi II*. Bret Koitka from Bribie Island with his 5 inch gauge *Sweet Pea* tank engine, was triple-heading with Dave Muscat's 0-6-0 switcher and our own Norm Hale's 0-6-0 tender loco *Luke*. Their efforts helped our club enjoy one of its best ever Beef Week celebrations. As always things started out slowly but by Saturday, most could see that last year's revenue tally was in sight. On Sunday the chase was on and by the last run there was a new record. In the parade that wound its way through the main streets of town on the Saturday were several of our members with their locos on trailer floats and signs promoting our society. Gilbert Simpkins drove his traction engine *Thor* and chuffed and whistled his way amongst the general parade of floats, running circles around them, much to the delight of spectators and their children.

Pacific Coast Railway Society Inc.

Location: Cnr Queensland Road and West St, Casino

Public Running: Every Sunday
<http://www.casinominirail.com/>

Galston, NSW

With the onset of cooler weather, work has resumed laying paving bricks in the area adjacent to the station. As part of the work a shallow dish drain will be constructed to direct water run-off from the loco area across to the north end of the station. The paving work has vastly improved the area and restricted the erosion that was depositing silt onto the rail track at the station.

Work has commenced on the modification of the loco unloader. The old screw thread lifting mechanisms at the corners have been removed, considerably lightening the structure. A screw down brake mechanism is being fitted. The fork-lift mechanism will be relocated to the other side of the unloader to allow access to all of the elevated roads. Some of the elevated roads will be raised and re-aligned for easier loco servicing and connection to the unloader. Fluorescent lights have been installed under the roof extension.

Preparation and drainage work for replacing the track in the tunnel is now complete. A new jig has been completed for the construction of straight sections of track to the new design of liftable 6 metre sections on plastic sleepers. Its first use will be for the tunnel track. The re-wiring of the signals and points at the north end of the station and the adjacent main line is now complete. The new wiring is in conduit with ample capacity for expansion and accessible terminal boxes. The old gantry has been removed.

The workshop is proving very popular with several projects under way at the same time, including new fence panels, new club carriages and new track. Shelving has been installed above the bench to store small components and fasteners. A near-new compressor has been

purchased for the workshop. It has a 3 HP, 3-phase motor and is rated at 16 cubic feet per minute.

Hornsby Model Engineers Co-op Ltd

Location: 29 Mid Dural Road, Galston

Public Running: 2nd Sunday
<http://www.sdr.com.au/hmecl/>

Hobart, Tas

The Hobart Miniature Steam Locomotive Society Inc. (HMSLS) committee for 2002 are President: Derek Sandle; Vice President: David Crisp; Hon Secretary: Henry Sharp; Hon Treasurer: Phil Rozemulder and Committee: Les Curry and Graham Norman.

Recently members packed their lunches and traveled to Ranelagh, south of Hobart, to visit Phil and Girder Rozemulder's property where Phil has an extensive workshop — in fact he has two, one for metalworking and the other for woodworking. Phil has a well equipped and laid out metal workshop and is currently in the process of constructing a NSW Class Z12 locomotive. The opportunity provided for some good exchange of ideas between members and a chance to observe Phil's equipment. Phil has all the castings for a NSW Class C38 so we hope to see it on the track in the future. It was very pleasant to see the members bring their 'better halves' along also to enjoy a very pleasant BBQ.

The HMSLS conducted its first competition day for the year by having a slow running event. The idea was to see who could run their locomotives the slowest over a measured distance without stopping — the distance to be covered by each locomotive was calculated by a specific formula derived by the Chief Judge, David Crisp. Well the winner for the day was Graeme Seabrook on his electric powered



From left: Hobart MSLS President Derek Sandle, the late Les Curry and Vice President David Crisp at the completion of the club's refurbished dual gauge elevated track in 2001

5" gauge LNER steam tram who simply dialed up the required speed and flicked a switch — the HMSLS never discriminates between members so well done Graeme. Second place was won by Derek Sandell on his steam powered 3½" g William.

It is with sadness that we advise that one of HMSLS' most highly respected and hard working members, Les Curry passed away after a short illness. Les was an engineer for the most of his working life and although he had officially retired several years ago his services were in such a demand that retirement never really happened. Les loved a challenge and over the years many HMSLS members would turn up to his workshop with a problem and always leave with a solution — he was generous with both his time and knowledge. Although Les built a 2½" g Juliet which he ran around his property, to the delight of his children, he never completed his 5" gauge Sweet Pea as he was always doing things for others.

Hobart Miniature Steam Locomotive Society Inc.

Location: 275 Flagstaff Gully Road, Lindisfarne

Public Running: None

Email: gnorman@southcom.com.au

Horsham, Vic

Steady progress has seen the second stage (inner loop) of 5/7¼" ground level track completed. Well almost, a modification is now obvious to ease congestion in the yard entry area. Materials are in hand and a full day working bee should see the job done. We were very fortunate to receive a grant from a local Sports and Community Club this will go towards landscaping the area and moving a foot path that crosses three tracks.

Plans are with local council awaiting approval to start the station building. It would be great to have this done before next Easter, as we are only 400 metres off the highway that takes Melbourneites and others to Adelaide for the convention. Any visitors will be most welcome. Please enquire if you need further info.

Club secretaries and others please note our postal address is now 145 Firebrace St Horsham 3400. As this is the address of our track, Sawyer Park Railway it should not change in future. Moving the track once was enough for most of us.

Our annual meeting just held, saw all positions re-elected for another term, with our small membership everyone has an important role to play.

Wimmera Live Steam & Model Engineering Soc. Inc

Location: cnr Hocking & Firebrace Streets, Horsham

Public Running: 2nd Sunday

Invercargill NZ

Winter is now well and truly upon us, and with colder evenings and weekends the best place to be is in the workshop

with the heater on full blast. Several members are working away on their various projects, now that lawns don't need to be mown or gardens tended so often. A quick count up of projects our members have on the go includes, at least seven live steam locomotives, two traction engines, a scale road roller, garden railway locomotives and rolling stock, and several small traction engines. Hopefully when summer rolls around we will see some of these completed models running at the club.

The shortest day of the year was marked by several members travelling to Gore to take part in their Mid-Winter run at the Hamilton Park track. Several members made the pilgrimage with locomotives and traction engines, and some enjoyable running was had on what started as a fine afternoon, but unfortunately the weather turned decidedly wintry later on. A notable participant was Andy Comerford, who was steaming around on his Burrell traction engine in fine style after it having a tune up in Bevan Wilson's workshop

At the AGM the President's Trophy was awarded to Erle Fordyce in recognition of his work in caring for our grounds and as the mainstay of the Tuesday Group over the past year.

On the Marine side as a result of the club pond getting a clean out and then being re-sealed, there has been an up surge in the interest of model boats and boating in general. At the conclusion of the AGM a few of us interested in boats got together and discussed the possibility of forming a group.

Southland Soc of Model Engineers Inc

Location: Surrey Park, Invercargill

Public Running: None

Maidstone, NZ

The last couple of working bees have concentrated on digging out and boxing so we can pour the concrete apron and barbeque area to the north of our station building. It is good that we have now got our work programme to the stage that we are able to begin work on things like the club barbeque. They will improve the scope for social activity at our club rather than strictly railway oriented work.

We now have pretty well sorted out the two major projects we targeted for 2002. They are the closing in under our station canopy and the concreting of the station apron and barbeque area. The remainder of the work we intend for this year is a range of small jobs and preparation for our open weekend and formal track opening in January 2003.

Our Annual General Meeting held no surprises. There were only the two expected changes in club executive positions. Alan Kemp has stepped down as President and Brian Shears as Treasurer. George Harvey and Barry O'Callaghan replaced them respectively. Alan Kemp was elected a Life Member of our Society in recognition of his long and active par-

ticipation in operation of the club, and his vision and drive toward construction of our ground level railway.

Maidstone Model Engineering Soc. Inc

Location: Maidstone Park, Upper Hut

Public Running: Every Sunday afternoon October-April

Maryborough, Qld

The immediate past president, Bob Lisle (the Muffin Monster) was presented with a gift of appreciation on behalf of the members of the Association. Bob had the distinction of holding the office of President for eight years and of Vice President for eight years. To have held office for 16 out of the Association's 25 years existence was quite an achievement. We thank him for the time and effort he dedicated over those years and trust Bob will get a lot of help from the mobile table we presented him.

The AGM saw George Bishop elected President, Des Rowland as Vice President, Graham Chadbone returned as Secretary and Clive Bliss returned as Treasurer.

Model Eng. & Live Steamers Assoc, Maryborough

Location: Queens Park, Maryborough

Public Running: Last Sunday

Melbourne, Vic

Our May meeting opened with approximately 100 members attending to hear our guest speaker Frank talk and show slides on the difficulties involved in restoration work carried out to St Patrick's Cathedral in Melbourne.

Models on the table consisted of early automobile wooden steering wheels and how they may have been constructed. Another member showed his initial machining operations to a Roseberry engine. Also shown was one member's use of old printer parts to devise a digital readout. Another member who took the opportunity to thank all members for their ideas and feedback on a difficult riveting job that he had presented at the previous meeting showed a small oscillating steam engine. Lost was mould, wooden puzzles that where created by one member's father where shown, as well as another question to the audience of how one could build up the teeth of a bicycle de-railer sprocket.

A last minute visitor from a group of people trying to establish a new club in Melbourne to race tethered cars spoke to gauge support and new members.

The night closed with tea, coffee and lots of friendly discussions.

Melbourne Society of Model & Experimental Engineers.

Location: Meetings are held 2nd Friday at 92 Wills St Glen Iris 8.00pm start.

Public running: None.

Millswold SA

The concreting of the ground area through the covered portion of Millswold Station has now been completed. The

dustiness and unsure-footedness for station attendants has now been eliminated and all agree that the area looks far nearer.

As mentioned previously, it has been decided to completely renew the 5 inch and 3½ inch gauge track. This was mooted as long ago as 1992, but kept on the back burner. This year the track renewal will really swing into action, the "dicky" section from the tunnel exit to the girder bridge having been renewed in May 2000, heralding the start of the renewal programme. The curved section along the driveway has been completed as well as the curved section from the turntable run-off points around to the girder bridge.

On the 7¼" layout it is planned to install a siding North from the Millwood Station track adjacent to the Signal Box. The purpose of this siding is to allow a train into the station, unload passengers, and then "back" on to the siding. The benefit will be when a driver wants to give his train a spell, oiling up or rostering off if we have too many trains on the track. At present a train has to do a lap of the grounds in order to get off. The reverse occurs when coming into traffic. The earthworks have been completed pending the availability of the set of points.

May 2002 represents the 75th Anniversary of the formation of our society. The inaugural meeting was held in May 1927.

South Australian Soc of Model & Experimental Engineers

Location: off Millwood Cres, Millwood

Public Running: 1st Sun & 3rd Saturday

Moorabbin, Vic

Anyone visiting the track recently will have seen the furious pace of construction of the new dual gauge (0/1) track. Our aim was to have the new track open for use by the Kindred Society Days weekend and this aim was achieved. The steps over the track to allow access to the steaming up area to both old and new tracks, are a work of art. The attendance on the Saturday was most gratifying. Lindsay Crow's "Garratt" with a long line of hopper trucks in tow was a sight to behold.

For the Kindred Society Runs the weather forecast was very ominous. However, the rain held off until it was time to go home on the Saturday and, again, Sunday morning was quite good.

On Saturday, there were 82 names in the attendance book and 21 locos on the larger tracks, nearly all of which had a run. Visitors included Kevin Wadley from the Lake Hume Society with his *Mountaineer*, Len Stampton from Westernport with *Speedy*, Cliff Kirby from Loddon Valley with his GWR Pannier tank and goods train, including private owner wagons, and the Durham family from Altona with their tram and fancy driver's car. The GWR 2-6-2T and 2-8-0T locos, of John Ousey and David Smith were resplendent in their fresh coats of paint. On the GG there were around 15 locos. The Garratt

was going well enjoying the wider radius of the new track. Sean Wilson's SNCF loco and carriages looked great running on the 0 gauge line. Max Kuhn's *Speedyette* and coal wagon looked good in green and Neil Riches' train of 4-6-0 with those blue carriages also looked great. The dedicated group of cooks and kitchen hands turned on a tasty BBQ lunch while the endless cups of tea and coffee were available all day. The ladies provided a very enjoyable afternoon tea.

There was a small, but interesting, display of locos in the club house. The double-size *Tich* in its carry case on the floor was a good reminder of how rapidly trains get larger and heavier when the scale is increased. The weather forecast for Sunday was not good and we were not surprised that fewer attended with only 26 names in the book. Altogether a very enjoyable weekend.

Steam Locomotive Society of Victoria

Location: 128 Rowans Road, Moorabbin

Public Running: 1st Sunday

Morphett Vale, SA

On Saturday the 29th June 2002, we celebrated our 25th year of operations with a fun run day, barbecue, cakes and drinks. About 70 people turned up including Barry Glover, President of the AALS, and a couple of locos from interstate. We were very lucky as it was a lovely day, considering the weather we had a few days before. A good time was had by everybody, few were surprised at our set up and favourable comments were made about our track and construction technique. Our remote control signal and point operation also had many intrigued. For those interested the remote unit was obtained from Jaycar. It is their Momentary Unit having a transmitting distance of about 50m. The Club purchased four transmitters with another four belonging to club members.

The operation is simple, on approaching the signal, if the route indication displayed is not one you require, just press the button on the remote transmitter. The signal aspect will return to the stop position, the switch rotor will run and change the road, switch blade detector contacts

will be made and the signal will then clear for the route selected. All switch running rails are track circuited preventing the operation of the switch under a train. Once the switch and signal has operated, it cannot be changed until the approaching train clears the fouling point of the switch. For club members who wish to operate the switch and do not have a transmitter, two concealed local control buttons are provided at the control box, and with the correct operating sequence known to club members only, the switch and signal can be changed.

The control box was strengthened by double plating all sides of the box and door with ½" steel plate. The box houses the remote control unit, three solid state track relays and associated resistors together with nine mechanical relays performing the interlocking. The aerial for the remote control is placed outside the control box and is fed into a drilled out plastic sleeper and sealed, this being bolted to the box and is vandal proof. We found the receiver would not receive signals more than 20m distance with the aerial inside the box. Placing it outside the box as described solved the problem.

This signal has allowed the running of trains from the old Loop Line and the new Sub Main Line to the newly constructed Passing Loop Line which is now connected to the original Main Line through a bladeless switch, with train movements being controlled by train approach colour light signals. The club at this point of time has four colour light signals and seven switch machines controlled from the signal cabin, and there are fourteen colour light signals and two switch machines around the track controlled automatically by the passage of trains.

The rolling stock department has installed a rolling stock lifting gantry over one of our steaming up bays and this now allows the lifting of large locos and rolling stock for under-gear repairs. With the purchase of two more auto couplers, all our passenger cars are now fitted.

Morphett Vale Railway Inc

Location: Wilfred Taylor Reserve,

Wheatheaf Road, Morphett Vale

Public Running: 2nd & 4th Sunday



John Wakefield's model of proposed South African 22 class 2-10-4 is huge

Nambour, Qld

The Club has recently had a new awning 9 x 4 metres erected and this has covered the space between the two existing awnings and now provides a shaded area for passengers waiting for a train ride.

Our President, Bill Bagley, has his 7 $\frac{1}{4}$ " gauge BB18 $\frac{1}{4}$ up and running and together with two other members' engines, club members had an extra running day in May for 70 students and carers from Currumbindi Special School and The Queensland Disabled Services Nambour. Our local State Member Peter Wellington, Channels 7 and 9 and local newspapers attended and gave us very good media coverage. We were all rewarded by the students' smiles as they travelled the 1.2 k track on the trains over a three hour period.

Vandals broke into our container and stole several items resulting in members carrying out some heavy repair work manufacturing a new door. The turntable has been lifted off its mounting, cleaned, painted and repair of bearings carried out and we no longer strain backs turning engines, but apply effort to retard its rotation. Visitors are always welcome.

Shunshine Coast Railway Modellers Society Inc

Location: Jubilee Park, Florence Street, Nambour

Public Running: 4th Sunday

Newcastle, NSW

The Maitland Steamfest was another great week. This year, our display comprised 27 locos, 2 traction engines, 1 steam boat and enough rolling stock and ride on wagons to make up six trains. This did not include the 4 locos hauling passengers in the school ground Saturday and Sunday.

Fine weather again provided ideal running conditions for our 49th Birthday Run. The visitors began arriving on Friday morning, the last leaving on Monday. This year we had a total of 52 different locos running over the weekend including some from our Club. There were 130 visitors from other Clubs also. Although visitors were not obliged to haul the public on Sunday, it is good to see so many willing to assist.

Work around the park is progressing at a steady rate and the signal lights that are to be installed at the 7 $\frac{1}{4}$ " station are being fitted and tested. The planting on the tunnel is starting to take hold. The plan is to get more pea vines to grow over the sides to help stabilise it. This will be done in the spring.

Lake Macquarie Live Steam Loco Soc.

Location: off Velinda Street, Edgeworth

Public Running: Last Sunday (ex. Dec)

Perth, WA

It has been a while since the last detailed report from Castledare, and a lot has happened in that time. Firstly, the club has a new president, with the hot seat now occupied by Geoff Thompson.

Thanks are due to retired president Rod Pitt, who continues to energetically support the club's activities.

The Canning, Fern Road and Convention Loop sections of the railway have all been re-opened to passenger traffic, following extensive site remediation works. A new, all steel, signal box has been installed at Canning, replacing the wooden original which was burned down by vandals. In addition, the main club buildings have been re-painted in a uniform livery, and a new rainwater tank has been installed. Plans are in hand to create a new workshop area by enclosing and extending the existing 5-inch gauge shed. There has also been a systematic push to clear the backlog of maintenance around the site, and the Canning area in particular looks much improved as a result.

Public patronage has remained good, with the recent July run day being one of the busiest ever. Our steam engines continue to raise interest from all ages, and have attracted a couple of articles in state and local newspapers. Colour promotional brochures prepared by Craig Belcher were well received by the public at the recent AMRA exhibition in WA. At the August run day, the railway expects to achieve a milestone by carrying its one millionth passenger. Another milestone coming up is the club's 40th anniversary in 2003. Plans are under way for celebrations, to which other clubs will be invited.

Our club can be contacted via the secretary, Ken Belcher, on (08)93575 1223, email: skbelcher@wiredcity.com.au

Castledare Miniature Railways of WA Inc

Location: Castledare Place, Wilson, WA

Public Running: First Sunday

<http://d1565.tripod.com/cmr/>

Wandong, Vic

Wandong Live Steamers (WLS) have not had an entry in *Club Roundup* for a while, so for those who are not aware of this club, we are situated in a natural bush setting at Wandong, right beside the main line to Albury/Sydney, about 50 k north of Melbourne. The track is 5" gauge. We do not conduct public running but are happy to entertain visitors. We generally have one run day and one workday every month, on a Saturday.

Member's locomotives range from *Blowflies* and *Sweet Peas*, Baldwin moguls, scale models of standard gauge English and American locos including 4-4-2, 4-6-2, 4-8-2 and 2-6-6-4's and a Baldwin 2 foot gauge 2-4-4, and scale models of Aussie locos such as 36, VR X and K. Locos currently being built include a Hagen's Patent Tasmanian J class, a couple of 38's and a VR S class. The club's Boiler Inspector recently won both major awards at the Convention for his magnificent H 220.

The track is a 900m circuit of the 10 acre property, which twice crosses a creek that runs through the middle of the block, on two extensive bridges. There is a 6-track yard and a separate loco

servicing/turntable/loading area. Over the creek, at the high point of the track, there is a crossing loop and water column.

The club has just installed a loading traverser to replace the single loading ramp that has been in use since inception. This should make the loading and unloading of rolling stock much faster and easier, particularly as locomotives seem to be getting larger and heavier. An additional road to the steaming bays has also been installed, so that there are both on and off roads to prevent congestion at times.

New membership enquiries are welcome to the Secretary, 16B Vista Av. Ringwood East 3135.

Wandong Live Steamers Inc.

Location: Mathieson's Siding, The Dene,

Wandong

Public Running: none

Warner, Qld

By the time you read this our 70th celebrations in July 2002 will have been completed and I will report on this event next issue. As reported earlier the elevated track is to have the trestle steel section replaced with concrete and this work is about to commence. More earthworks have been carried out to enable the main line at the exit of the spiral to be realigned to provide a spur to the roundhouse. Being a glutton for punishment and to keep our "workers" focussed our President has suggested that we set a target of November 2003 as the date for the completion of the new main line. He also saw it as another excuse for a party. Warner has carried out an extensive overhaul of the club loco this year and from those who drive it the running improvement has been very noticeable. The members have also decided to build a club "Diesel" modelled on a 610mm track prototype. It will have an 0-6-0 wheel arrangement and be jack shaft driven via a hydraulic system. To date a rolling chassis has been assembled. Those of our members who attended the 2002 Convention at Evandale and the subsequent holiday voted it a wonderful experience. Well done Tassie!

Qld Soc. of Model & Exp. Engineers Inc

Location: 122 Warner Road, Strathpine

Running Day: 2nd Sunday except December, by invitation. No public.

<http://www.steammachine.com/qsmee/>

West Ryde, NSW

On the President's Breakfast and Sick Kids Day, not wanting to break with tradition, the President was late (as usual) to the breakfast, which was in full swing by 8.30 am. Of course the advantage of this was that he was able to walk straight in and have a wonderful brekkie of snags, eggs, bacon and onions. Toast was available and pikelets were devoured with jam and cream. There was only a moderate roll up of members, but this was no reason to leave any leftovers and everything that was cooked was consumed.

Following on was our charity run for

Malcolm Sargent. During the day, there was lots of singing and dancing, large outsize characters on the trains, plenty of balloons and everyone having a good time. Some of the characters there were: Luna, Sailor Moon, Sailor Mercury, Madeline, Penny the something, Curly the Koala, and Treble Clef the Malcolm Sargent Mascot. If you thought they were fun, you can see them on TV Saturdays mornings (?).

The weather was glorious, the company pleasant, the day was lazy (for members) and active for kids, and everyone had a great time. This is our premier charity event, as it is actually for the kids themselves, not just money.

Ray Lee ran his new 30 class in April. It has been under construction for just 12 months and has some novel features including slip eccentric valve gear (including a quadrant gear reverser), and runs on wet steam. You oil the eccentrics by squirting oil in the side tank fillers. The side tanks themselves are full of lead. In conjunction with the loco Ray has constructed a six wheel gin to carry the water

and driver. Both the gin and the loco are magnificent pieces of work. After some final tweaks and painting, it will be a six car train loco on the running days! Hopefully Ray will produce a newsletter article in due course. (and AME too, Ray?)

Sydney Live Steam Locomotive Society

Location: Anthony Road, West Ryde

Public Running: 3rd Saturday (pm)

www.pnc.com.au/~wallison/slsls.htm

Wellongong NSW

The April running day saw the introduction of the 'fourth run' and for those who are not in the know it goes like this — another platform has been constructed on the main line at Mt Pleasant Station, where the passengers form a queue along the existing wire fence. Once loaded, the train passes in front of South Box, through the long point, past the dunny, up past the boom gate and down the 'eastern main' before joining the main line just in front of North Box.

Of course, to operate in this manner both signal boxes have to be manned at all

times and as this run had been trialed previously, but not on the unsuspecting public, it's needless to say that on the day, the signal box operators were confused, the drivers were confused, the station staff were confused and the track superintendent was pulling what's left of his hair out.

Illawarra Live Steamers Co-op Ltd

Location: Stuart Park, Virginia St, North Wollongong

Public Running: 4th Sunday

http://www16.brinkster.com/ils2500

Farewell

We say goodbye and thank you to these model engineers who have passed on:

Geoff Baumgartner (Evandale LRSS)

John Dale (Southland SME)

Bob Logan (Lake Macquarie LSLs)

Murray Mitchell (Tullamarine LSS)

Frank Smith (Lake Macquarie LSLs)

and extend our condolences and best wishes to the family and friends they leave behind.

Coming Events

7 to 8, 14 to 15, 21 to 22 September

Mudgee Wine Festival Invitation runs

The Mudgee Miniature Railway invites all model engineers and interested people to come to Mudgee on any of the listed weekends and join us for the annual Mudgee wine Festival. Our track is 3 1/2" and 5" gauge ground level and is located 6k north of Mudgee on the Ulan/Cassilis Road. The track will be open from 9am on Saturday (no public Sat) with a BBQ tea and night running while Sunday is our public running day. There is also ample room to run traction engines, etc. As accommodation in Mudgee can be at a premium during the Festival, you should organize yours as soon as possible. You can camp at the tracksite but there is no power. You can obtain further details on accommodation and local attractions by contacting the Mudgee Visitor Information Centre on Freecall 1800 816304 or (02)6372 1020. Anyone intending to come please contact Secretary, Peter King (02)6373 3626 or write to PO Box 373, Mudgee NSW 2850

14 September

All Comers' Day — Box Hill Vic

Box Hill Miniature Railway Soc. invite you all to attend. Boiler certs a must. BBQ lunch and afternoon tea provided. Contact Sec. Tony Richardson (03)9898 2671

21 to 22 September

Invitation Run & Floriade — Canberra NOTE CHANGE OF DATE!

The members of the CSMEE invite you to again enjoy a weekend of steam amongst the tulips in the national capital. Track is 5" and 7 1/4" ground level, swing-nose frog points accept most wheel standards, min radius 13.7m (47 ft). Char, briquettes, steam oil and petrol supplied. If you wish to bring a 3 1/2" engine let us know and we will have our portable elevated track on site. Saturday no public running, Sunday normal running day (visitors welcome to partici-

pate if they wish. Boiler certs a must. Sat. night meal. Ph/fax David (02)6254 1641

5 to 6 October

Model Engineering Exhibition — Melbourne Vic

The Melbourne Society of Model & Experimental Engineers are again holding their popular two-yearly exhibition at Monash University, Clayton. With the aim of promoting model engineering in all its forms and providing a venue for model engineers to come together, it is expected that again a large number of clubs and exhibitors will participate. No exhibitors fees as cost will be met by door sales and commercial exhibitors contributions. The large modern well-equipped display area is in the engineering faculty at the university. Contact Bob Jones (03)9801 6048

11 to 12 October

29th Annual Steam Festival — Galston NSW

Hornsby Model Engineers invite you all to attend their annual 5" gauge run. Displays will include boats, traction and stationary engines, IC engines, models under construction and much more. Boiler certs essential. Lunch and teas available each day. Ph. Sec. (02)9484 7583

18 to 20 October

14th Australian Miniature Traction Engine & Road Steam Rally — Canberra

Details on page 47

18 to 20 October

Berry Railway Invitation Run

7 1/4" gauge scale rail track, traction engines and steamboats all welcome. Block system signalling. Current Boiler Cert. and AALS standard wheel profiles required. Warm friendly and layback atmosphere. No Public running. Stacks of room to camp on site if

you wish or B&B and Motel accommodation nearby. Contact Tom Reinhold on (02)4297 1852 or PO Box 324 Berry NSW 2535 email tombindi@vtown.com.au

19 to 20 October

Annual Invitation Run — Cobden Vic

Will be held in conjunction with Cobden Spring Festival and the members of the SWME invite you all. Char supplied. Bring current boiler cert. Adam 0419 344 911

1 to 3 November

Invitation Days — Wagga Wagga NSW

This popular annual event is on again. 5" and 7 1/4" track in scenic surrounds, traction engines, stationary models, historic engines, HO scale layout. Contact David Font (02)6921 4762 or email: dfont@tpg.com.au

16 to 17 November

20th Anniversary Weekend — Bunbury WA

Members of the SWME would like to invite all club members to our 20th anniversary at Forrest Park Railway, Blair Street, Bunbury. Saturday will be train running, videos, BBQ and night running. Sunday is club's public run day for those who wish to stay over. 2 1/2"/3 1/2"/5" elevated track, 5"/7 1/4" ground level. We will supply char, coal and oil. Contact Sec. (08)9721 2034

21 to 23 February 2003

50th Birthday Run — Edgeworth NSW

The Lake Macquarie Live Steamers invite you to this special event. See ad on page 6.

8 to 12 January 2004

Steam & Steel 2004 — Hamilton NZ

The Hamilton Model Engineers are hosting the next New Zealand Convention. Full details appeared on page 44 in the last issue. For more info, contact Valerie Clarke at 51 Alderson Road, Hamilton New Zealand. Ph. 64 7 8551 927, Fax 64 7 8551 307 or email bandyclark@xtra.co.nz

Edge Finders

By Chris Hollands

Finding the exact edge of a piece of metal you are working on with your milling machine or lathe attachment is, for a lot of people, fairly hit and miss. The following information assumes that you are one of these people, but even if you are proficient, feel free to read on.

To do the job the tool you require is very simple and there are a few versions, some excellent and dead accurate and some not so good in the author's opinion, though no doubt some people will disagree. I have used all of the types I'm going to look at and I'm sure there may be other versions but these are the common one's and fairly easy to buy from a machine tool and cutter supplier, through the price may vary a lot between different makes and suppliers, so hunt around.

There are basically three types of edge finders each with different variations. The first is what is called a manual edge finder, the second is an electronic edge or surface finder, and the third is what is called a wiggler edge finder.

Electronic edge finder

I will deal with the electronic version first because unless you are lucky enough to have a digital readout that has an electronic edge finder outlet it is out of the picture — it is very basic in operation. The end of the edge finder is a certain size say 20 thou OD or maybe 5mm and you move the work piece towards the edge finder until the two just touch. The digital display will indicate when this has happened or maybe some other indication

such as beeping or other indication on the screen will tell you. You have now found the edge of the work. Now, depending on the size of the edge finder end you are using you zero your dials or digital display and move exactly half the diameter in the direction you were moving and you will have the exact edge of the work piece in relation to the centre line of the mill or lathe. Once you have done this for both X and Y axes, you then proceed with what ever you want to do.

The manual version

Next, the manual edge finder which, in my opinion, for the average person like me and most people reading this magazine, is probably the best one to buy. Out of the two basic edge finders (disregarding the electronic edge finder) it is very simple to use and very accurate if used properly. It is basically the same in a lot of ways as the electronic unit in that the ends are an exact diameter precision ground. The difference is that the ends are attached to a larger diameter body by a spring which holds the parts together but the ends can move sideways from the main body. I use imperial edge finders because that is the dimension type I use for the 1½" Union Pacific Challenger I am building at present. They do come in either imperial or metric.

There are two styles or types available (photo 1). The first is a straight edge finder and the other is what I always buy and what I would recommend, namely a combination edge finder and centre finder. You can find either edges or centres or scribed lines on most items either straight or curved and are very easy to use.

The bodies are either ⅜" or ½", 10 or 12mm. The straight contact is 0.200", or 5mm for metric. The centre finder is a cone and will vary in size depending on the body diameter — the bigger the body the bigger the cone.

To use, the edge finder is placed in either a collet or chuck. The worktable is then moved towards the edge finder until contact is made between the rotating edge finder and work piece (photos 2 and 3). The contact will shift until the contact runs concentric to the body, and with very slight additional table adjustment will move off-centre with a decided wobble. At this point the centre of the finder is exactly one half the diameter of the contact from the work edge. Now lift the finder (without moving the table) clear of the work piece and move the edge finder one half

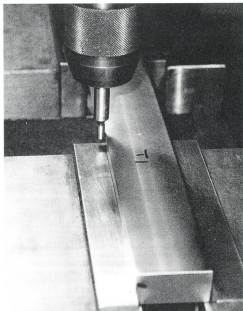


Photo 2

the contact diameter towards the work piece. You now have the exact edge and dead centre of the collet or chuck. Now you can proceed with machining the work piece relative to that edge or proceed to find other points you require locating before machining starts.

The centre finder is pretty straight forward to use. It is only for holes that are smaller than the cone on the end. I use it mainly for finding hole centres but it is very handy for finding the centre of drilled holes if you want to drill a bigger hole for what ever reason. I just feel the edge of the centre finder in relation to the main body and move the table until I can't feel any difference between the body and centre finder end and that is the centre of the hole. Just a note — the bigger the body the bigger the cone on the end so the bigger the hole you can find the centre of.

The wiggler

Now the wiggler edge and centre finder which comes as a set — you can buy individual wigglers, but most people would buy the full set, which you can see from photo 4 is made up of 5 parts, the main item being the chuck which holds the various indicators. The indicators are snapped into the chuck without removing the collet nut and are clamped by a ball swivel joint which permits adjustment to an angular position or true running.

Now the indicators:

With point 'A' working centres can be accurately located. Spring tension on the ball of the point permits guiding the point to run true so the work piece can be brought into alignment with the machine spindle.

Ball indicator 'B' (0.250") and Indicator

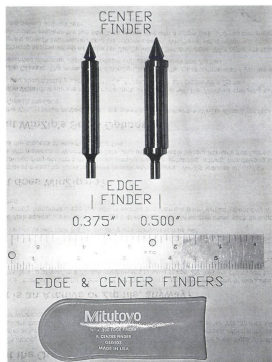


Photo 1

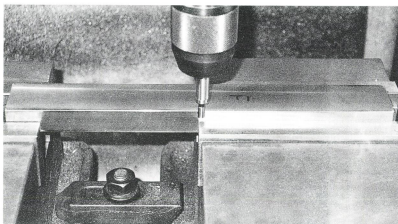


Photo 3

contact 'C' (0.100") are used similarly to the manual edge finder. With the indicator spinning true you bring the contact ball or edge towards the edge of the work piece until contact is made. At this point a slight adjustment of the table and the indicator will shift off centre this exact edge of the work piece. Now move the table half the diameter of the contact in the direction you were moving and you have the exact centre of the spindle in relation to the edge of the work piece.

Using offset indicator holder 'D'

With a suitable dial indicator you can check holes or OD's for run out or con-

centricity or what ever you want to check or align. You will find that one of the edge finders will become one of the most important pieces in your workshop, but care should be taken when using these items as they will take a fair bit of abuse but once damaged then they will never give a correct reading again.

The manual edge finder relies on a spring to work and hold the parts together so if this spring is deformed in anyway then you will have to buy a new one, so do not bring the edge finder down on top of something or push the contact too far sideways while the spindle is turning.

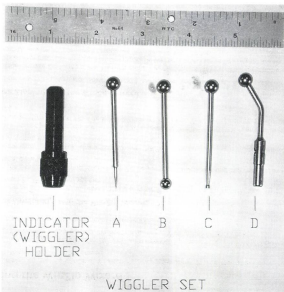


Photo 4

These edge finders are not cheap for what they are (the wigglers are cheaper) and the price of these items in Australia is ridiculous. I buy mine from a company in Canada, as they are a third of the price even after paying tax. If you know someone in Canada or the US, ask them to get you one or if you don't find someone, pay \$70 to \$100 or for one in Australia. The most surprising thing is Starrett is cheaper than Mitutoyo. Work that one out!

**Australian
Model
Engineering**

New Subscription Form

Post: PO Box 21, Higgins ACT 2615. Australia
Phone/Fax: (02) 6254 1641
Email: amemag@bigpond.com

I wish to begin subscribing to the **Australian Model Engineering** magazine for **one year** commencing with issue **105 — November-December 2002**

Subscription rates:-

Australia **\$38.00** (Includes GST amount of \$3.45)

New Zealand **A\$47** (Air Mail)

Other Countries **A\$58** (Air Mail)

☐ Tick this box if this is a **gift subscription**. What is the occasion (e.g. Birthday)
Name of person sending gift

Subscriber's Name Phone (.....)

ADDRESS

Post Code

Enclosed a **Cheque / Money Order / O/Seas Bank Draft**
or please debit my **Bankcard / VISA / MasterCard**

A\$

--	--	--	--

--	--	--	--

--	--	--	--

--	--	--	--

Card Expiry Date
...../...../.....

Cardholder's Signature Name on card (print)

Letter Box



Lathe tool grinding

Sir,
I must thank Peter Dawes (*AME Letter Box*, issue 101) for his kind remarks about my response to his article on eccentric turning.

Those who share my interest in using computers to make life easier in the workshop may be interested in my system for grinding lathe tools. Briefly, it consists of an easily constructed jig which enables a 1/4" square HSS tool bit to be supported in any orientation. Used in conjunction with a surface grinder, this allows the various surfaces to be accurately ground with no risk of burnt fingers.

There is of course nothing new in this idea and even in the absence of a surface grinder, a similar jig can be used with a grinding head mounted in a milling machine.

The key to my system is a computer program which enables the jig settings required to produce any desired combination of cutting angles to be easily calculated — even when the bit is mounted in a holder which supports it at an odd angle to the tool post.

As can be seen in the accompanying screen shot (below), the program allows a choice of materials. The effect of choosing a particular material is to alter the

default values of rake, clearance and approach angles. The range of materials and the associated default values can be edited by the user. The program also allows details of tools produced to be recorded in a "library" on your computer disk - this being of convenience when a tool requires resharping.

A more detailed description, together with the program executable, can be found on my website at www.magna.com.au/~davhos by scrolling down to the end of the page and clicking on "Grinding lathe tools".

David Hoskins
New South Wales

Thanks for a great weekend

Sir,
Over the long weekend in June, the Illawarra Live Steamers staged the 8th Annual Hot Pot Run and I believe an article appears elsewhere in this issue. Visitors to this event came from as far a field as South Australia, Victoria and Queensland whilst there was a very good roll up from the various Clubs in NSW with some of the visitors arriving on the Friday and staying over till the Monday.

At this point in time I would like to take the opportunity on behalf of the members of the ILS to thank one and all

that turned up and made the weekend the success it was. The following Wednesday saw the left over soup, 72 cans, donated the Wesley Mission in Wollongong.

On the Saturday there were 257 registrations, 229 on the Sunday and 56 on the Monday, with a total of 72 locomotives in attendance over the 3 days and next year promises to be bigger and better?

The garage sale sees a lot of "treasure" exchanging hands and proves to be rather popular however, you all missed out on the bargain of the year with the "whacker packer" at \$100. With no takers one of our clever, younger members turned up with his tool bag on the following Saturday, cleaned out the carburetor and the fuel tank, two pulls of the cord and away it went! The only problem now is to find someone to hang onto the business end?

Incidentally, if the person who left half his tool kit behind would like to contact me on (02)4284 4202 and correctly identify it we shall endeavor to get it back to you.

Ross Edmondson JP
President, Illawarra Live Steamers

And now for a topic which always seems to get the letters flowing ...

Understanding superelevation

Sir,
There are several points in Mr. Jon Milne-Fowler's article *Understanding Superelevation* (*AME* #103) that would benefit from some clarification.

Under the first equation **E** is defined as being in inches. I believe it is in millimeters. (In the subsequent example the result is labeled "mm", albeit after a slight change in the form of the equation).

The imperial example at the end of the article, the constant 20 should be replaced by approximately 15 (14.957-) if the intent is to compute the **equilibrium** superelevation.

I believe the subject might be a bit easier to understand if the balance equation was shown devoid of all constants except the gravitational constant. It is:

$$E = \frac{S \times V^2}{R \times g}$$

where:

E is the equilibrium superelevation in the same unit as the rail center-to-center spacing (see next).

S is the rail center-to-center spacing in any linear unit, typically given in mm or inches. For crowned rail of average profile, this is about 1.04 to 1.05 times the track gauge.

V is the train speed in meters/second or feet/second.

R is the track radius in meters or feet.

g is the gravitational constant: 9.80665 meters/(second * second) or 32.17405 feet/(second * second).

Note that V, R, and g must be either all metric or all imperial. E and S are in the

Tool Angle Calculator

Tool holder

None

Tool Bit Slope

0

Tool Bit Angle

0

Material

Mild Steel

Notes

Compute

Exit

Cutting angles

Front Rake

10

Side Rake

10

Note sign of top side rake is reversed for LH tools

Top/RH Turn/LH Turn/RH Face/LH Face

Jig settings

Hor Axis Angle

-14.0

Rot Axis Angle

-45.0

Results

Top

Front rake: 10

Side rake: 10

Jig settings

Hor axis angle: -14.0

Rot axis angle: -45.0

Clear

Heading

Date/Time

Add

Print

Add to Lib

same linear units.

The constant of 11.82 in the first and second equations cannot be derived from this form of the balance equation if you use the track gauge as 'S' (see above). You must use the rail center-to-center spacing to match Mr. Milne-Fowler's definition of super-elevation: *Superelevation is measured vertically from the top of the inner rail to the top of the outer rail.*

A good reference on this subject from the University of Queensland may be found on the internet at: <http://www.uq.edu.au/dia/civ4410/track-notes.pdf>. Refer to equation 5 on page 7.

An excellent resource for unit conversions and the source of the gravitational constants above is: <http://www.davidson.com.au/tools/convert/de-fault.asp>.

Finally remember you cannot change from a straight, flat track to a curved track with super-elevation without a transition spiral. These curves were described in *AME* #102 by Mr. John Hagan on page 55. The curve normally used has the property that the super-elevation changes linearly with the distance along the curve as does the curvature (1/Radius). The horizontal profiles of these spirals, called Cornu or Euler spirals, can be computed using complex Fresnel integrals or they can be found in books such as Searles' *Field Engineering*.

Glenn Peterson
Washington (state), USA

Sir,

I am pleased that Glenn Peterson has troubled to respond to my contribution. I was hoping that someone more qualified than I would have presented an article along the lines of my attempt to simplify a very complex engineering problem. I agree that in the first equation the value of E should be in millimetres and do not dispute his assertion that in the imperial example the constant "20" should be "15" as he suggests, however in that instance I was quoting from a source which I am sure has been used by many enthusiasts as a reference. (Not all model engineers seek to understand the mathematics which they

must from time to time apply.)

Glenn is entirely correct in referring to the desirability of introducing transition curves between a straight section and a curve of fixed radius, but the object of my article was to try and demystify a subject about which some contributors to the magazine seemed to be confused.

Perhaps I should add that I understand that in Western Australia prior to WW2 many branch lines were laid without transition curves and a special project was instituted in the late 40s and early 50s to reconstruct the lines which were to be retained in accordance with recognised standards. The work was supervised by a Polish migrant engineer who had served with the RAF during the war and had married a Scots lass. At a luncheon group which I attended he gave a talk about the work and demonstrated a mechanical calculator which was used to provide the surveyors and tracklayers with the data needed for setting out each curve on the line.

Jonathan Milne-Fowler
Western Australia

Note — An error crept into one of the derived formulae statements in the article which will be evident to any assiduous reader. A third of the way down the RH column on page 52 the word "minimum" should be maximum. i.e. the maximum safe speed may be calculated by using-

$$V_s = \text{sqr of } [121.4 \times R \times x (E+D) / W]$$

Sir,

Apart from the mixing of units, I think Jon Milne-Fowler (*AME* No. 103) has got the concept of super deficiency a bit confused when applied to a miniature railway. On a miniature railway there is very little difference between slow and fast speed, and a super set up for a reasonable speed that achieves equilibrium wheel loading is quite achievable, and suits the small range of speeds we are talking about.

In full size it would difficult to super-elevate a curve that suits normal passenger trains at 100 km/h, the XPT at 140km/h, and any other train that happens to go slow at that particular place. The super-elevation would be a compromise and would be set up for a suitable speed, with a consequential 'deficiency' at the full line speed.

On a miniature railway, and especially on 5 inch gauge ground level systems, the stability of the passenger is paramount to maintaining train stability and hence it is very important that the train rounds the curves at the correct speed that gives the equilibrium situation for the super-elevation actually installed on the curve. Hence in these situations, 'super deficiency' is not required, and in fact, would be detrimental.

On a larger gauge miniature railway, the stability of the carriage is probably such that it can withstand an unstable passenger load, and hence the equilibrium speed is less important, but still, cant deficiency is much less important than in full

size.

While the precision involved in a miniature railway is difficult because of the various sizes of passengers carried (from small children to large adults) the loading on any particular carriage would tend to even out and hence the centre of gravity can be reasonably constant.

It is the centre of gravity that combines with the gauge of the railway to determine the overturning (or critical) speed, and as the radius reduces, this speed approaches the operating speed. We need to keep a reasonable safety margin between the operating speed and the critical speed, but it does demonstrate how important it is to ensure passengers are carried in equilibrium around the curve. At speeds above the equilibrium speed (such as when operating with a cant deficiency), passengers can well start responding to the forces they are experiencing and their reaction may well introduce instability.

Jons' statement that the cant deficiency on a 5 inch gauge railway should not exceed 8mm is misleading. For a 9m curve, I would be recommending a 3mm super-elevation and a speed of not more than 5km/h (about a walking pace). The critical speed in such circumstances is about 10km/h. It is not reasonable to have speeds faster than this for public running on such sharp curvature, and an 8mm deficiency on a 3mm super is clearly a bit out of whack.

This could have been brought about by Kevin's example of 10 mph on a 50ft radius curve and 7 1/4 inch gauge. Martin Evans has also used these figures in his book 'Outdoor Model Railways'. This speed for the radius is quite extreme. Maybe a more realistic example would have put things in better perspective.

Warwick Allison
New South Wales

(And here is one which I found in the files which was missed a couple of issues back ... Ed.)

Sir,

I note in the November issue of *AME* page 13, that Kevin Bruderlin seems to have doubts about the formula he quotes for super-elevation of rail tracks. I can assure him that the formula has a sound theoretical basis and is correct, apart from the presumed typographical error that the super-elevation calculated is in inches not feet. The formula assumes that the centre of gravity is in the middle of the vehicle and calculates a value for super-elevation so that the resultant force from the combination of the weight and the "centrifugal force" acts in a direction perpendicular to the track. If this is done, there will be no side forces between the vehicle and track. The weight will also be equally distributed between the wheels on the left and right hand sides of the vehicle, thus removing the tendency to overturn. The super-elevation calculated is the vertical distance that the top of the outer rail is above the

Letterbox Contributions

You are welcome to send letters by mail to:

PO Box 21, Higgins, ACT, 2615 or
phone to: (02) 6254 1641 or
e-mail to: amemag@bigpond.com

As far as possible, *AME* is an open forum for all members of our hobby. Therefore, all expressions of fact or opinion as long as they are not libellous will be considered for publication.

Please type or clearly print your letters, as script is often difficult to interpret. Due to popularity of *Letter Box* and limited space, letters of 400 words or less will have a better chance of being published.

op of the inner rail.

In common with most theoretical analyses the formula must be applied with that invaluable commodity, common-sense. The zero side force only applies at the stated speed. At low speeds there will a side force in the opposite direction, so the choice of a suitable value for super-elevation should consider the range of speeds which will be used. In a practical case there are also other more nebulous forces imposed on the vehicle, eg wind forces and buffer or drawbar forces which have to be accommodated. In our sizes the passengers are a large proportion of the total vehicle weight, so the position of the centre of gravity and hence the liability to overturn is more dependent on them than the super-elevation, perhaps the guard should have a long stick to keep them in line!

F A J Collin
United Kingdom

Train wheel slip

Sir,

I tried this experiment to uncover some of the puzzles about wheels slip.

Take a cotton reel and cover the rims with masking tape to provide friction. Put a pencil up the centre hole so that the reel can freely rotate when placed on a gramophone turntable at 45 rpm. The pencil is positioned radially to the centre.

Results

Reel rpm with the inside rim only touching is apparently the same rpm as with both rims touching.

With the outside rim only touching, the rpm increases and returns to normal again when both rims touch. Apparently only the outside rim has slip. Does this mean that the outside train wheel is the only one to slip?

My loco with the no coning and operates on an anticlockwise circuit fitted with flat 25 x 12mm rail has groove wear only on the right hand or outside wheels. Is there a theory to explain this?

Ted Crutford
South Australia

A mill engine called Alice

Sir,

In the AME #45 (Nov-Dec 1992) Peter Luky started a series of articles on the construction of a sugar mill engine called *Alice*. I have not read or seen mention of any completed in "our Mag" so enclosed is a photo of my effort. It has a couple of differences so it is called *Like Alice*.

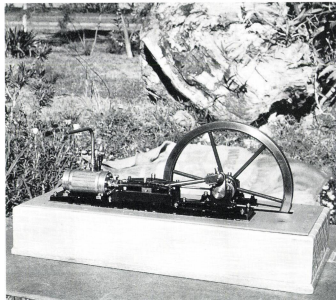
Everything is made from what was available except for a few screws. The idea for the flywheel came from an article in an issue of the English *ME* a few years ago. The rim is from a circular valve plate from an air compressor, with an inner ring of $\frac{3}{8}$ " x $\frac{1}{8}$ " bms. This ring has 6 equally spaced holes for the $\frac{3}{16}$ " spokes. The hub, or centre, was centre drilled in 6 places. Two opposites were drilled right through, the other 4 only part way. On

assembly a long length of $\frac{3}{16}$ " round steel was inserted through the inner ring and through the hub and out the other side of the ring. This is to help locate the centre. The other spokes are then inserted — all spoke ends must be below the outer surface of the ring. Araldite® was used to hold it all together. Mine had to go back into the rim machining jig as it did run very true, to be bored out and bushed.

The foundation is scored to represent stone blocks. Peter said he used 10mm to the foot scale, so the scoring represents blocks 1' x 1' x 2'.

The cylinder is lagged with timber strips and the whole engine is on a sheet of #14 steel. The foundation is not a solid block, just a base with 2 sides and 2 ends.

John Single OAP OBE
New South Wales



John Single's mill engine *Like Alice*. In the background is part of the base of a tree which was blown over in a strong wind.

Box annealed steel

Sir,

I have long contemplated building a "gauge steam locomotive and now believe I have the capability to carry such a project through to successful completion.

In prospect, many questions arise and in the first instance there are two to which I would like answers. They are:-

1. The Locomotive Boiler.

The AMBS Code requires boiler design drawings to be submitted to an authorized inspector. If I wish to submit clear, complete drawings of a model boiler at a scale other than full size, will the Inspector accept such drawing(s) at say, half scale or even multiple A4 sheets? If not, why not?

2. The locomotive frames.

The British model engineering press has, for years, carried the debate about the preferred use of bright versus black mild steel for the construction of locomotive frames.

While in the USA some years ago, I put the question to a group of live steam miniature locomotive builders. The immediate and unanimous response was (sic) "We use 'box annealed' steel for the frames."

"Box annealed?" I enquired. "What is that?"

The question simply brought a response of amused disdain so I did not pursue the matter.

Lately I have been conducting e-mail correspondence (appended) with a major steel supplier on the subject of 'box

annealed' bar for the purpose of making frames for miniature locomotives. The firm described 'box annealed' steel and my prospects for supply were looking decidedly optimistic. E-mail correspondence on the firm's part abruptly ceased when I stated the modest quantity for my requirements.

I wish to know why 'box annealed' is not commonly available as the preferred material for locomotive frames when it seems that its use would eliminate the disadvantages of both black and bright mild steel?

'Fred'
Victoria.

Email correspondence.

Original query repeated below.

Would you please tell me if there is such a product as 'box annealed' steel bar, say 3mm thick, 100 mm wide as opposed to black or bright MS bar for the purpose of making miniature steam locomotive frames. I was made aware of the product in the USA but have not pursued my inquiry here.

Yours,

Response:-

Box annealing is annealing metal or alloy in a sealed container under conditions the minimize oxidation. In box annealing a ferrous alloy, the charge is usually heated slowly to a temperature below the transformation range, but sometimes above or within it, and is then cooled slowly; this process is also called "close annealing" or "pot annealing". Given we now know the procedure could you give me an indication as to what quantities you require and when you would require material. Once I get this I will endeavor to find out who can do the procedure.

Regards.



News Desk

with David Proctor

Welcome to yet another issue which, I hope you have enjoyed reading. Remember the *Dog Spike Whistle* in the last issue. Well, if you would like one and don't want to make it yourself take a trip to the Pine Creek Railway Station in the Northern Territory and you can purchase one. They have been selling various versions for years.

Since the last issue I have been contacted by two different parties who may be able to produce **decals** for the 422 class loco and for other projects as well. In the next issue we should be able to advise availability and prices, so stay tuned.

2003 AALS Convention

To date no details have been forthcoming from the organisers of the next convention, which is being hosted by the Penfield Model Engineers at Salisbury in South Australia. Easter falls on 18 - 20 April, 2003. I expect preliminary details and registration forms will be out soon.

Trade & Commercial

Greenwood Tools — Indexable Tooling for Australia

For many years Greenwood Tools has been a main distributor in UK industry for most major cutting tool manufacturers. In the last decade they have established a premier position in the UK model engineering market by supplying top quality indexable insert tooling. This has been

achieved working with many local model engineering societies to establish a range of standard and bespoke tooling to bring "industry standard principles and practices to lower powered machines.

With modern international communications, and via their website www.greenwood-tools.co.uk we can take advantage of this leap forward. To quote Greenwood Tools, "Wake up from your nightmare" by using indexable carbide tooling with a proven pedigree.

Greenwood Tools have taken a half page advertisement on page 2 of this edition of AME to show the most popular items from their extensive range. Orders can be placed by telephone, fax, post, email or internet. Payment can be made by cheque or credit card.

Note that **AME Retail** have an extensive range of videos available now and by the time you read this they will also have the **2003 calenders** in stock.

New trophies

It is obviously the season for trophies as two new ones are announced in this issue. Firstly there is the **Aradley-Triton Trophy** (this page) and secondly the **AME Traction Action Trophy** (details in *Traction Action* on page 46).

Next issue

- Coming up in the next issue —
- The start of a short construction series

for a universal test and demonstration loco stand

- Bracken Ridge's 6th birthday bash
 - Cumbres & Toltec Scenic Railroad
 - more on the paddlesteamer Eureka
- Plus much, much more. See you then.

LATE NEWS

Port Augusta steam up

The Port Augusta Model Engineers have advised they will be holding their Annual Steam UP on the October long weekend (5th - 7th) at their track in Homestead Park, Elsie street, Port Augusta. All are welcome, details from Secretary G Eberhard, 5 Higginson St, Port Augusta 5700, ph. (08)8642 4246 or email: eariding@centralonline.com.au

New trophy

The Australian Association of Live Steamers will be instituting a new competition trophy at the annual Convention next year in South Australia. This trophy will be known as the

Aradley-Triton Trophy

It will be awarded for the **first attempt by model engineers of any age**. The model must be steam powered and can be a locomotive, road vehicle, boat, plane or stationary plant.

It must be a genuine "first attempt" and be exhibited or run at the annual Convention. Unfortunately all those who have built more than one model cannot enter their first attempt.

An Entry Form will be sent out with the Association's first Convention mail out shortly.

Perhaps you could bring this to the attention of your readers so we may have a big headache in store for the judges.

— Barry Glover (President, AALS)

Classifieds

Colchester Student Lathe for sale

- Lathe geared head, gap bed, height 6 inches, 36 inches between centers. Powered cross feed, imperial and metric calibrations and screw cutting, 3-jaw sc.chuck, 4-jaw indep. Chuck, both Pratt. Suds pump, face plate and driving dogs, fixed and traveling steadies. Lathe has been unused for several years but is in excellent condition. 16mm drill chuck and tooling included. Selling due to ill health. Price \$5,000. Phone John (02)5494 1191

Second hand rotary van oil emersed vacuum pump

- Good for lost wax casting and similar. 50 ltr/min to 300 ltr/min \$100-\$300. Ph. (03)9800 4886

For sale — Toy soldiers

- Pewter toy soldiers 1/32 scale, www.microcredit.com.au or e-mail rid@asitis.net.au or send\$5 for catalogue to PO Box 219, Merimbula, NSW 2548

Wanted: plans for fishing reels

- Any fly, centre pin or overhead reels, after small reel plans mainly but anything will do.. Would like full machinists drawings, assembly drawings, etc. Willing to cover all costs. Ph. Shane (AH)

(08)9853 1134 or email caudwell@denmarkwa.net.au or S Caudwell, PO Box 5567, Albany WA 6332.

Loving home needed

- Toby, a blue 0-4-0 5" gauge modified *Sweet Pea* built by Charlie Mears, is looking for a new home. Last steamed 1995 then stored in Townsville, it has not seen a great deal of running. Replica NSW BD wagon riding car and timber passenger trolley with vacuum braked Sandberg bogies. Toby is a solid cost effective entry into live steam with heaps of potential, but is not a "ready to run" beginner's loco. Priced accordingly — offers over \$3,000 from good homes. Ph. John Bell (AH) (07)4725 2102 or email: jbell@austranet.com.au for more information.

For sale — 7 1/4" gauge diesel outline petrol loco

- With driver tender, 2 x 6" pass. Carrying carriages, guard tender, lit-tle use. \$6,000 negotiable. Ph. (03)5886 1552

Model machining services

- Examples:- lathe, milling, tapping, boring. Casting done to you drawings. Supplier of tools, e.g. drills, lathe, milling cutters.. For further details write, fax, phone Stephen Palmer, PO Box 95, Windsor NSW 2756. Fax (02)4572 5679, Phone (02)4574 0153

AME volume 1 issues 1 to 6 for sale

VGC. To highest written bid received by 30/10/02. G42-AME, PO Box 451, Belgrave Vic 3160. Funds to G42 restoration.

For sale — garden railway G scale, Gauge 1 locos

Live steam collection. Aster, Roundhouse, Argyle and Merlin. From Aster JNR 4-6-4 coal fired to Argyle NG Philadelphia 0-4-2. Contact me for list, prices, photos, etc. Demonstrations available. All locomotives little used and in superb condition. Priced to sell. Email: greens@satlink.com.au or phone (03)5974 3670 for descriptive leaflet.

Machining-fabricating capacity available

Turning, milling, welding, tooling, will tackle anything. Frank Zizza, 6 Elizabeth St. Euroa. Vic 3666. (03)5795 1551

Multiguage railway for sale

Holt & Pine Ridge Railway, ground level $7\frac{1}{4}"/5"/3\frac{1}{2}"/0$. 20x16' lengths around perimeter of large block. 9x16' lengths $7\frac{1}{4}"/5"$ sidings. Track is $1"x\frac{3}{8}"$ and $1"x\frac{1}{4}"$ steel on edge, sleepers $1"x\frac{1}{4}"x12"$ steel on hardwood all welded to Aust. Standards. Turntable $7\frac{1}{2}"/12"$ dia. with traversing top $7\frac{1}{4}"/5"/3\frac{1}{2}"/0$. 3 steaming bays 1x8', 1x7', 1x6' all multiguage. Points 1 LH, 1 RH, both multiguage. 1 LH dual gauge. Overhead footbridge, "Warren" through-truss track bridge. Definitely no time wasters. Video available. \$4,000. 5% deposit, non-refundable. Jack Fitzpatrick Ph/fax: (02)6254 3518 or jhmbfz@alphalink.com.au

5" gauge American box cab electric loco for sale

- With 200 amp Mosfet controller.
- 5 foot riding car with brakes and matching 4-wheel caboose. All in excellent condition. \$2,500. Ph. Ken Morecroft (03)5998 7362

For sale — deceased estate

- Partly built 5" g. Europa class of 1873, 2-4-0 express engine and tender. No. 54 Asia. Drawings and castings by Reeves of Birmingham. Work already done is to extremely high standard. For further details contact J Lemon, 173 Auld Kirk Road, Deviot, Tas. 7275. Ph/fax (03)6394 7429. Delivery can be made in October to Melbourne, Ballarat, Goulburn or Sydney and places en route. Price \$1,100 or near offer.

Wanted to buy

- Sievert handpiece with economizer hose & burner and (brass) taps and dies and ME Workshop magazines from No.1 to now. Contact Geoff fax (03)9798 8581

For sale 5 inch and 7 1/4 inch loco kits

- All with boilers, all new, American and English, all sensible offers will be considered. Total of 4 steamers, most with drawings, and some boiler fittings, 2D you make the price.
- $7\frac{1}{4}$ inch Petrol Hydrostatic, air brakes, electric start, alternator, 2.3m wagon with air Brakes, covers for loco and driving truck, must be driven to appreciate. Offers around \$9,00, very good unit for a very good price, just start up and drive. Contact Ray Catts on (02)6922 3540

Hot air projects for sale

- Horizontal Engine Kit: 10cmW x 24cmL x 7cmH. \$149.90
- Vertical Engine Kit: 12cmW x 12cmL x 30cmH \$179.90
- Horizontal Eng Kit with 2V gen: 10cmWx21cmLx17cmH \$194.90
- Vert-Horiz Engine Kit: 10cmW x 21cmL x 15cmH \$179.90

Contact Edwyn Jones (07)3351 4454 for further details and specs.

Two very reliable locos for sale

- $7\frac{1}{4}$ " gauge steam loco with 2 riding trucks (open wagons) & 4-wheel brake van with lights and auto couplers. 12V. \$13,000
- 830 class "Mustard Pot" with 4 riding trucks (open wagons) & bogie b/van with lights & auto couplers. \$14,000
- Spray wagon for maintenance on track & surrounds (with hand wand), stainless steel tank on bogies. \$1,200
- 2 Dodge starter gen, 1 working, 1 needs attention \$250 pr. Ph. Barry on 0427 803 159

Unimat SL cross lide for sale

- Unused. \$60 or near offer. Ph. (03)5278 6602

Wanted — Audel's Engineers and Mechanics Guide

- Complete 8 vol set or loose vols, also Light Steam Power magazines. Ph. (03)5126 2202

Myford ML7 long bed lathe for sale

- On cabinet stand, metric gearbox, lots accessories incl. trav. steady, spare tool steel, good condition. \$2,200. Ph. (02)6372 3330,

Subscribers' Free Market

FOR SALE

Mill-drill, 1HP, 3MT, 585 x 190 table, 12-speed with splash tray, stand, like new \$1000. (02)4757 2629

Hercus Model 9A lathe, quick change gearbox, good condition. 0419 201 994

AMEs for sale. Nos 14-15, 17-18, 21, 20-30 inc. 34-81 inc. \$1-50 ea.

Very good condition with covers. Ring John (07)4632 1683

Two Dodge starter generators suitable for traction motors. Good condition. \$120 each. Phone John (07)5494 1191

HELP

Any M.E. made "Odds & Ends Hit & Miss Engine" Home Machinist 1986 and working please contact L. Beswick, Jetty Rd, Coles Bay, Tas 7215

WANTED

Issues 52 and 54 Model Engineers Workshop magazine. Ph. Bruce (02)4868 2030

Small lathe, screw cutting, single phase. Small gas furnace. Copies of Strictly IC magazine. Please phone Paul (07)4927 8734 Qld.

Cross-slide milling attachment for Chinese TYCO632 lathe. Harry, 1 Excelsior St, Manangatang Vic 3546. Ph. (03)5035 1459

ME volumes years 24, 25, 26, 27, 28 (1st half), 29 (1st half), 30, 32 to 45 inc. 47, 48, 49, 54 to 59 inc. Chas Goodwin (03)6425 1686 email: motton@bigpond.com

6 bearings NSWGR 5" C38 axes 1" ID, 11/2" OD, 3/4 long, needle or roller. Harry, 1 Excelsior St, Manangatang Vic 3546 (03)5035 1459

For Douglas 10" shaper, copy of handbook with lubrication details.

Will pay costs including phone. Max Gallagher (08)9381 9728 gmax@iinet.net.au

Someone to make lost wax castings. Small parts of wagon detail, 11 of each. Phone Len (03)9722 1710 (evenings)

Classified rates

- \$3.85 (GST incl.) per line as published (including heading).
- Don't send payment with ad, we'll invoice you after publication. No limit to the number of words.

Subscribers Free Market conditions

- Non-commercial only, at the publisher's discretion.
- Maximum of twenty words, including your contact name, phone number or address.
- On special form provided. (March & September issues).
- 5" gauge or larger locomotives (for sale) are not eligible.
- Only one entry per issue.

Don Young Railmotor



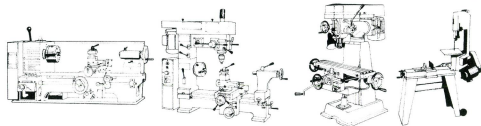
For Sale: 5" g with tender & riding truck.

Excellent condition. Boiler certificate. \$4500 ono.

Ph Graeme (02) 4950 4196. shango@optusnet.com.au

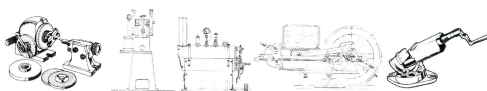
Lathes – Milling Machines – Band Saws – Machine Vices – Rotary Tables

Vertical Slides
Turning Tools
Boring Bars
Knurling Tools
Parting Tools
Die Holders
Centres
Collets
Chucks



Taps
Dies
Drills
End Mills
Reamers
Slot Drills
Boring Heads
Slitting Saws
Mill Cutters

Minitech for Model Engineers Supplies



Model Casting Kits – Engines Steam Hot Air Petrol – Materials

REAMERS

Adjustable Hand Reamer with HSS blades from **\$19.50**



Hand Reamer HSS Spiral Flute from **\$18.70**



Chucking or Machine Reamer HSS Parallel Flute from **\$18.70**



END MILLS



End Mill HSS Threaded Shank from **\$8.00**



Slot Drills HSS Threaded Shank from **\$8.00**



Ball Nose Slot Drill HSS Threaded Shank from **\$10.00**



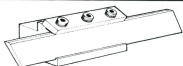
SLITTING SAWS - HSS
75mm / 3" x 25.4mm / 1" bore
Width: .05, .75, 1.0, 1.25, 1.5, 2.0, 1/16, 1/8
\$19.25

MODULE GEAR CUTTERS

8 Cutters per set from **\$236.50** per set
Sizes available include Module 3, 5, 6, 7, 1.0, 1.25, 1.5, 1.75, 2.0



Look at www.minitech.com.au for pictures and great prices



Parting Tools for 4 way tool posts

1/2" blade fits 3/8" tool post slot & 1/2" centre height **\$36.30**
3/4" blade fits 1/2" tool post slot & 1/2" centre height **\$49.50**
Includes HSS Blade

Parting Tools for mini lathes



MPT-001 Mini Parting Tool
8mm or 5/16" shank **\$18.70**
MPT-002 Mini Parting Tool
10mm or 3/8" shank **\$33.00**

New Products: HSS & Indexable Tip Boring Bar Sets for Boring Heads with 3/8", 1/2", 10mm, 12mm holes

ALL PRICES INCLUDE GST

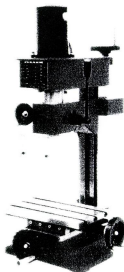
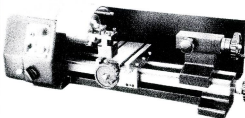
NEW VARIABLE SPEED

Micro Lathe and Micro Mill.

Lathe: 80mm chuck & 140mm swing with 250mm job length.

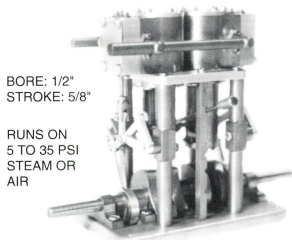
Mill: 240mm x 145mm table & MT2 spindle and drawbar.

Full range of Accessories available



6/16 Kenworth Place, BRENDAL Qld 4500. Ph 07 3889 7689 Fax 07 38896877
Web: www.minitech.com.au email: sales@minitech.com.au Catalogues Available \$5 posted

TWIN CYLINDER VERTICAL REVERSING STEAM ENGINE ASSEMBLY KIT



BORE: 1/2"
STROKE: 5/8"

RUNS ON
5 TO 35 PSI
STEAM OR
AIR

Completely machined. All Hardware included.
Only Hand tools required for assembly.

MODEL TVR1A \$570



**EMCO MACHINE TOOLS
AUSTRALIA PTY LIMITED**

2/247 Rawson Street Phone: (02) 9648 4377
Auburn, NSW, 2144 Fax: (02) 9648 4150
Australia ACN 002 506 139

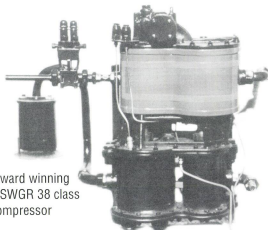


ROLLING STOCK AND DETAIL COMPONENTS

Australian Distributors for:

Doug Hewson (Models) UK
Rolling stock components

AME 422 class loco detail parts



The award winning
5'g NSWGR 38 class
Air compressor

For more information, send a stamped (\$1) A4 self addressed envelope to:

Scobie and Glover Sheetmetal Pty. Ltd.
31 Spinks Rd. CORRIMAL, NSW, 2518

Ph (02) 4284 0294 ACN 002 202 253 Fax (02) 4283 2331



More Details on our Website:
www.hobbymechanics.com.au

Suppliers of Machinery
and Tools for Working in
Metal and Wood

By agreement with N.S. & A. HEMINGWAY, Rochdale, UK, we are pleased to announce the availability of items to construct the world-renowned:

Versatile Dividing Head



Pre-cut Gears and Worms are available, as well as castings and blanks for plates. Please send S.A.E. for Details and Prices.

JOHN STRACHAN

HOBBY MECHANICS

P.O. Box 785, KENMORE QLD 4069 • Phone (07) 3374 2871

• Fax (07) 3374 2959 • E-mail: jstrach@powerup.com.au

E. & J. WINTER Model Engineering Supplies

An ideal start to the world
of miniature steam...

Professional quality, fully
detailed plans by Ernest
Winter. Comprehensive
casting sets for a growing
range of Australian steam



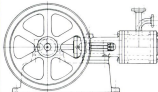
C38

locomotives including: NSWGR 12, 13, 30, 32, 35, 36, & 38
classes; SMR 10 class; VR K class. All in the popular 5"
gauge. NSWGR 36 class also available in 7-1/4" gauge.

Stationary and Marine steam...

The entire works of O. Burnaby Bolton, 23 stationary and
marine steam engines (incl. triple expansion engine). 13 IC
engines and over 60 live steam locos from O to 7-1/4" g.

Materials, Tools, fasteners etc., for the model engineer.



Plus More...

Plans from Nexus (*Model Engineer*) and Don Young.

Books from Nexus, TEE and Camden.

Castings for many Nexus and Don Young designs.

Send for our 44 page illustrated handbook just \$7.00 posted.

E. & J. Winter — Bolton Scale Models
PO Box 124, MEDOWIE, NSW, 2318

Phone & fax: (02) 4981 7999

e-mail: ejwinter@ozemail.com.au



More details on our website:

www.hobbymechanics.com.au

Suppliers of Machinery
and Tools for Working in
Metal and Wood

We Supply Plans & Castings for Queensland Locomotives



• QGR BB18-1/4 4-6-2 LOCOMOTIVE •

Built by Walkers Ltd. Maryborough Qld. 1959
The last mainline locomotive built in Australia

LOCO	NO. OF DRAWINGS	NO. OF CASTINGS
5" A10	12	76
5" A12	12	73
5" PB15	12	73
5" AC16	13	74
5" BB18-1/4	10	85
5" C17	6 (of 12)	57

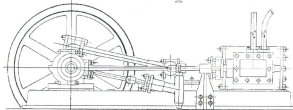
Plans now available for A10 in 7-1/4" gauge

HOBBY MECHANICS

PO BOX 785, KENMORE QLD, 4069 • Phone (07) 3374 2871

• Fax (07) 3374 2959 • E-mail: jstrach@powerup.com.au

E. & J. WINTER present...



The O.B. Bolton No.7 Horizontal Steam Engine

1 1/2" bore x 2 1/4" stroke single cylinder, double
acting, slide valve engine with integral boiler feed pump.

The presentation of our most popular larger stationary steam engine has been enhanced by the introduction of a comprehensive step-by-step fully detailed construction manual. The large component sizes make this design an easy-to-build first project or an interesting break between more complex engines. The engine makes an attractive working or static display and some are earning their keep as useful workhorses.

Plans (2 sheets) \$18.50

Casting set (28 items) \$241.96

Construction manual \$19.80

Material kit \$25.58, Fastener kit \$69.20

allow freight for 9kg plus lkg.

For casting list and prices please write, fax or phone:

E. & J. Winter

PO Box 124, MEDOWIE, NSW, 2318

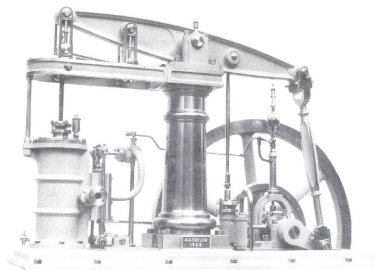
Phone & fax: (02) 4981 7999

e-mail: ejwinter@ozemail.com.au

Send for our 44 page
illustrated handbook
just \$7.00 (inc GST) posted.

STUART MODELS

a Tradition



**EMCO MACHINE TOOLS
AUSTRALIA PTY LIMITED**

Have our latest **Stuart Models** Catalogue mailed directly to you for only \$15

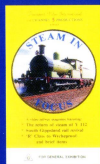
2/247 Rawson Street,
Auburn, NSW, 2144,
Phone: (02) 9648 4377,
Fax: (02) 9648 4150
ACN 002 506 139

We accept

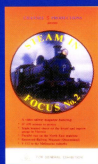


• Stationary Engines • Marine Engines • Boilers • Steam Fittings • Fixings • Materials •

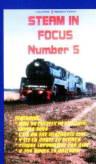
New Videos and Books



Video: \$29.50



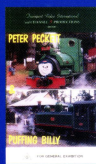
Video: \$29.50



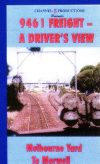
Video: \$29.50



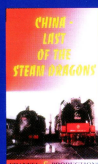
Video: \$29.50



Video: \$29.50



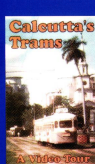
Video: \$29.50



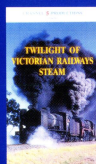
Video: \$29.50



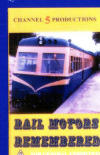
Video: \$29.50



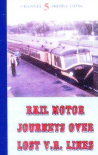
Video: \$35.00



Video: \$29.50



Video: \$29.50



Video: \$29.50

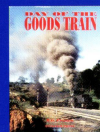


Video: \$29.50



Video: \$35.00

All videos are PAL VHS and around 50 to 55 minutes duration with the exception of "9461 Freight - A Driver's View" at 85 min.



Book: Days of the Goods Train by Ron Preston. 256 Pages. Hard Cover. Over 300 photos. RRP: \$55.00



Book: South Maitland Railways by Peter Attenborough. 128 pages. Hard cover. 140 b/w photos, 50 coloured photos. RRP: \$45.00

Other new videos:

Steam in Focus Nos. 3 & 4. \$29.50 ea.

R711 Back in Steam. \$29.50

Junee Roundhouse Celebrations . . . \$19.50

Last train to... Last Run of... . . . \$29.50

AME Retail

PO Box 1403, Tuggeranong, ACT, 2900

Phone / Fax : (02) 6292 1938

<http://www.ameng.com.au>

e-mail direct to AME Retail:

jpoliver@webone.com.au

Prices include GST, postage and packaging Australia wide except where indicated.

Payment by cheque, money order, Bankcard, VISA or MasterCard

Plough Book Sales

A History of Aircraft Piston Engines, 244 pages	\$58.00	Twin Cylinder Horizontal Steam Engine plans, 6 pages	\$7.50
A.H. McDonald, Industrial Pioneer, 318 pages	\$33.00	Design, Construction & Operating Principles of Electromagnets	\$20.50
A-Z of British Stationary Engines Volume Two: L-Z, 128 pages	\$43.45	Strictly I.C. magazine	\$20.50
Bentley Br2 World War 1 Rotary Aero Engine, 95 pages	\$53.50	Build from Water Energy Independence With Hydrogen, 251 pages	\$62.00
Brunel Style 1900-1932 by G.F.A. Gilbert, 226 pages	\$120.00	Ignition Coils and Magnetos in Miniature, How to build them	\$60.00
Brunel the Great Engineer by Tim Bryan, 160 pages	\$110.00	High Frequency Induction Heating (1944), 235 pages	\$29.50
Caterpillar Chronicle: History of the World's Greatest Earthmovers	\$69.95	How to Build a Solar Cell that Really Works, 22 pages	\$12.00
Caterpillar Seventy-Five Years by Thomas Wilk, 279 pages	\$110.00	How to Run Three Phase Motors on Single Phase Power, 20 pages	\$7.50
Crawler Tractor Scrapbook Part One by Richard H. Robinson, 160pp	\$54.95	Secrets of Lead-Acid Batteries, 44 pages	\$12.00
Crawler Tractor Scrapbook Part Four, 160 pages	\$54.95	The Tesla Disc Turbine by W.M.J. Cairns, 34 pages	\$23.00
Diesel's Engine Vol. I, From Conception to 1918, by Cummins, 768pp	\$135.00	507 Mechanical Movements (1893), 122 pages	\$19.50
Engines and Enterprise the Life & Work of Sir Henry Ricardo	\$95.00	Advanced Machine Work (1925 workshop), 800 pages	\$73.00
Experimental Flash Steam, 189 pages	\$51.50	Bent Iron Work Including Elementary Art Metal Work, 160 pages	\$24.50
Major Piston Aero Engines of World War II, 192 pages	\$135.00	Blacksmith Shop & Iron Forging, 96 pages	\$18.00
Producer Gas for Motor Vehicles, 194 pages	\$31.50	Build an Oil-Fired Tilting Furnace by Steve Chastain, 192 pages	\$45.00
The Pioneer of the Road, Australia's First Self-Powered Vehicle	\$22.00	Building a Small Lathe by L.C. Mason, 82 pages	\$33.50
The Rotary Aero Engine by Andrew Nahum, 64 pages	\$56.50	Decorative & Sculptural Ironwork & Tools, Techniques, 312 pages	\$100.00
Guide for the Boiler Attendant's & Engine Driver's Certificate, 269pp	\$27.45	Farm Blacksmithing Practical Hints for Handy-Men, 272 pages	\$31.95
Stationary Steam Engines of Gt. Britain Vol 1: Yorkshire, 320 pages	\$105.00	Forge Craft (1913) by Charles Philip Crowe, 175 pages	\$24.50
Steam Engine Design (1896), 192 pages	\$24.50	Foundry Manual (1958 US Navy publication), 300 pages	\$48.50
Traction Engine Design and Construction 1900 - 1930, 342 pages	\$165.00	From Forge & Anvil, Erich Riesel Hill Country Iron Worker, 96 pages	\$63.00
Beyer, Peacock locomotive builders to the world, 302 pages	\$132.00	Grinding, Lapping & Honing, 78 pages	\$22.00
La Locomotive A Vapeur by A. Chapelon (ENGLISH edition), 631pp	\$210.00	Hardening, Tempering, Annealing and Forging of Steel, 288 pages	\$24.50
Practical Distiller (1910), 156 pages	\$22.00	How I pour Babbit Bearings by Vincent R. Gingery, 43 pages	\$19.00
The Red Devil and other Tales from the Age of Steam, 522 pages	\$115.50	How to Build a Forge, 15 pages	\$12.00
Windmills & Wind Motors (1910), 78 pages	\$17.00	How to Run a Metal Working Shaper & Drill Press, 48 pages	\$17.00
A Practical Treatise on Hot Air Engines by E.T. Westbury	\$38.00	Indexing Tricks (1903 milling machine work), 31 pages	\$9.75
An Intro to Low Temperature Differential Stirling Engines, 88 pages	\$29.50	Iron Melting Cupola Furnaces for the Small Foundry, 129 pages	\$41.00
Building Simple Model Steam Engines by Tubal Cain, 107 pages	\$16.95	Lapping & Polishing by E.K. Hammond	\$20.00
Building Simple Model Steam Engines Book 2 by Tubal Cain, 106pp	\$18.95	Lil Bertha Electric Furnace, 67 pages	\$22.00
Building the Atkinson Differential Engine by Gingery, 112 pages	\$37.00	Machine Shop Methods by Lorus J. Milne, 376 pages	\$46.00
Building the Climax by Kozo Hiraoka, 224 pages	\$121.00	Machinery Handbook 26th Edition (tool box edition), 2511 pages	\$224.40
Building the Henly 'Junior' Steam Engine, 6 pages	\$6.80	Melting & Casting Aluminium (1925), 253 pages	\$24.50
Building the Stuart Beam Engine by A. Smith	\$26.00	Milling Machine Practice from Cincinnati Milling Machine Co. 28pp	\$9.50
Do It Yourself Vacuum Forming for the hobbyist, 125 pages	\$30.25	Modern Toolmaking Methods (1915) by Franklin D. Jones, 309 pages	\$31.50
Gas Engine Construction (1900), 296 pages	\$34.00	New Edge of the Anvil A Resource Book for the Blacksmith, 243pp	\$65.45
Gas Turbine Engines for Model Aircraft by Kurt Schreckling, 106pages	\$49.50	Plain and Ornamental Forging by Ernst Schwarzkopf, 296 pages	\$47.50
Making Clocks by Stan Bray, WPS No.33, 124 pages	\$19.95	Practical Lessons in Metal Turning & Screwcutting, 178 pages	\$35.00
Model Boilers and Boilermaking by K.N. Harris	\$51.50	Secrets of Building a Plastic Injection Molding Machine, 127 pages	\$36.50
Model Boilermaking Designing Making & Testing by E.L. Pearce	\$22.00	Simple Workshop Devices by Tubal Cain, WPS No. 28, 140 pages	\$18.95
Model Engineering, A Foundation Course by Peter Wright, 408pp	\$45.00	Sir Joseph Whitworth "The World's Best Mechanician", 228 pages	\$70.00
Model Hit and Miss Engine 1-1/8" bore 1-1/2" Stroke, 41 pages	\$34.00	Tabletop Machining A basic approach to making small parts	\$105.00
Model Petrol Engines - Design & Construction 3 pages	\$22.00	The Beginners Guide to the Lathe by P. Marshall, 93 pages	\$22.00
Model Stationary and Marine Steam Engines, 153 pages	\$47.50	The Care and Operation of a Lathe (1942), 105 pages	\$18.00
Model Stationary Engines, Their Design and Construction, 72 pages	\$22.00	The Complete Handbook of Sand Casting by C.W. Ammen, 238 pp	\$40.90
Model Steam Turbines-How to Design & Build Them by H.H. Harrison	\$22.00	The Machinist's Bedside Reader, Projects, hints, tips, 210 pages	\$49.50
Model Turbo-Prop Engines by Kurt Schreckling	\$49.50	The Machinist's Second Bedside Reader by G. Lautard, 213 pages	\$53.90
So You Want to Build a Live Steam Locomotive, 161 pages	\$86.90	The Machinist's Third Bedside Reader by G. Lautard, 250 pages	\$68.20
Steam & Stirling Engines You Can Build Book 2, 200 pages	\$99.00	Treatise on Milling and Milling Machines (1919), 409 pages	\$34.00
Steam and Stirling Engines You Can Build by W. C. Pitt, 160 pages	\$99.00	Turning Lathes: A Guide to Turning, Screwcutting, etc, 432 pages	\$60.00
The Model Locomotive from Scratch by B. Terry Aspin, 92 pages	\$29.95	"Uncle" Dave Gingery's Shop Note Book 1, 59 pages	\$20.00
The Model Steam Locomotive by Martin Evans, 208 pages	\$39.95	Ways & Means (1892 machinist book), 158 pages	\$24.50
The Stirling Engine Manual by James Rizzo, 195 pages	\$95.00	Zeus Precision Data Charts and Ref. Tables (Metric), 28 pages	\$12.50

We handle many other modeling, railway and metalworking books from the UK and the USA for a complete catalogue of over 6000 titles please send \$2.25 (Payment may be by postage stamps).

Or check out our web site at www.ploughbooksales.com.au

Please allow 12-15 weeks delivery for some items. Payment can be made by Bankcard, VISA card, Mastercard, cheque or money order to:

Plough Book Sales

PO Box 14, Belmont, VIC, 3216

Phone (03) 5266 1262 Fax: (03) 5266 2180

Postage and Handling Charges

Order Value	Postage Charge
\$0 - \$10	\$2.75
\$10 - \$20	\$3.85
\$20 - \$60	\$6.60
\$60 - \$165	\$10.45
Over \$165	Free